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MAXIMUM POWER COMPUTING

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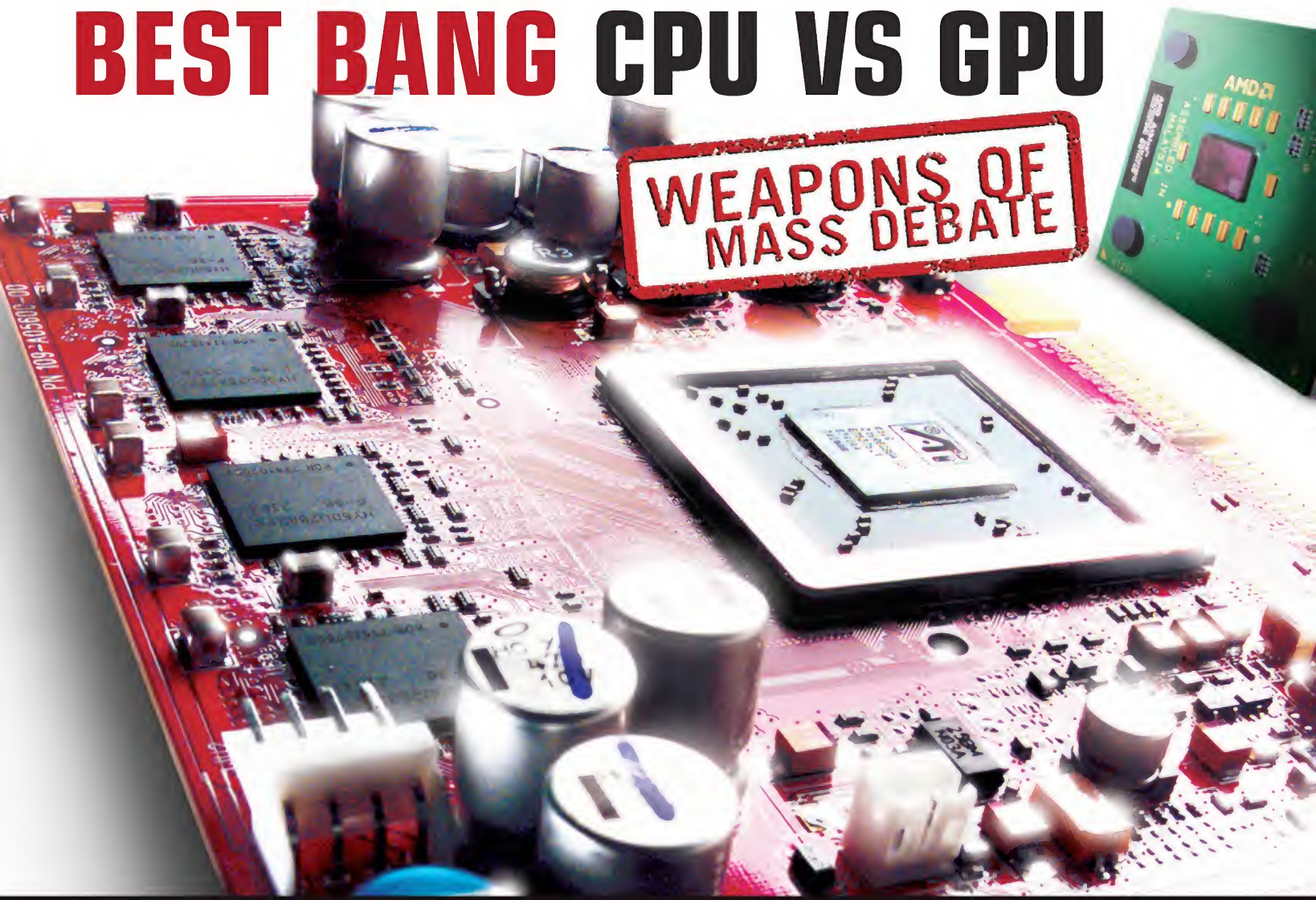
BEST BANG CPU VS GPU



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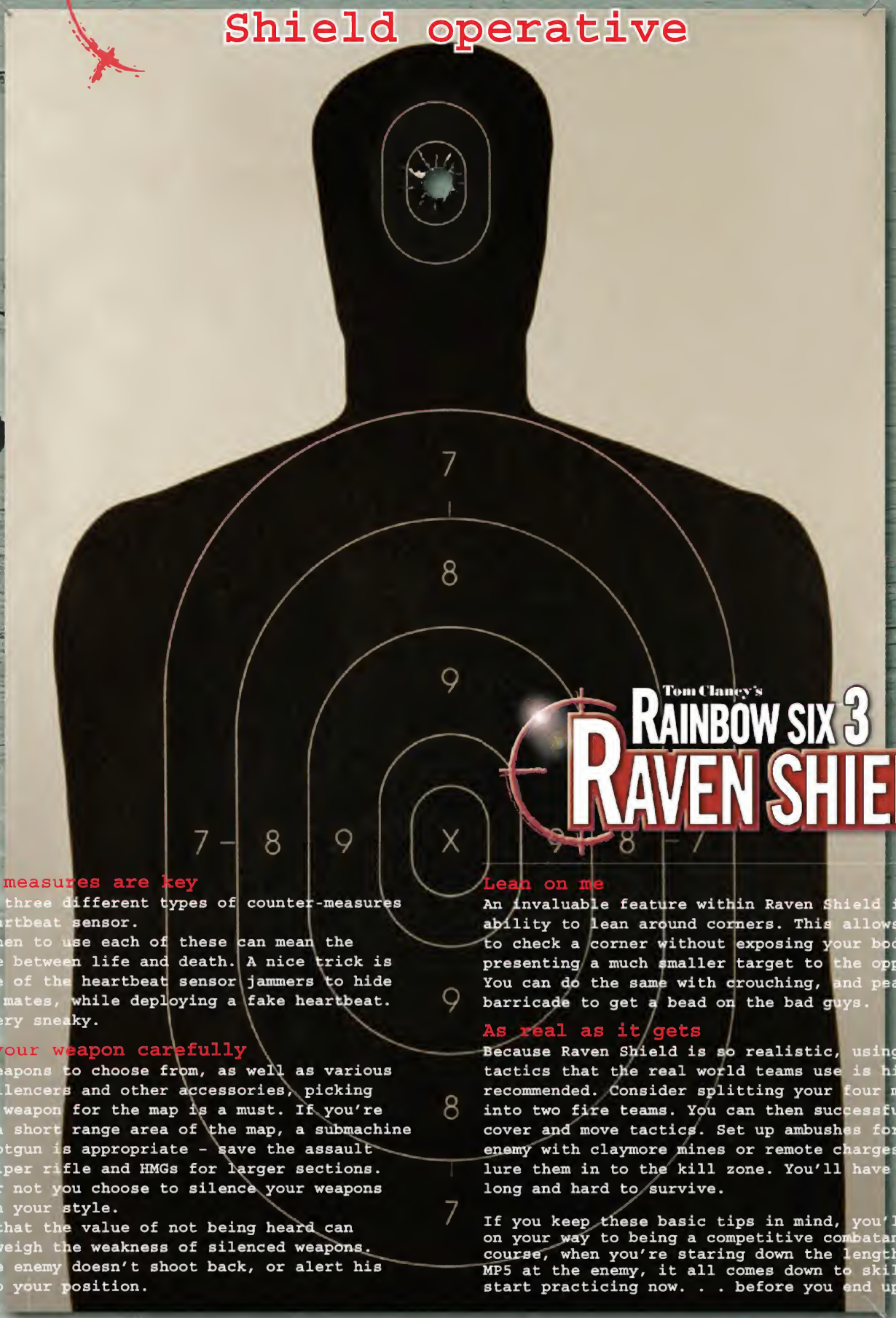
10 shots fired by your average first person shooter player

Raven Shield

Raven Shield is undoubtedly the most accurate depiction of modern close quarters combat available for the PC. Not only does it have a comprehensive 15 mission single player game that will keep you going for months, it also has one of the deepest, most realistic online modes around. And if you think you have what it takes to beat the best the online world has to offer, you should be in the Ubi Soft and Telstra Game Arena Raven Shield tournament.
All you need to compete is a four player team and the 1.3 demo of Raven Shield. That's right, you don't even need to purchase the full game to take part. The winners will also need a valid passport, as they'll be heading to Hong Kong courtesy of Ubi Soft. This will happen on the 24th of May, when the best Raven Shield players from the Asia-Pacific region will be going head to head.
Head over to http://rvs.games.telstra.com now to sign up your clan, download the demo and view the tournament rules. Stick to them, and you might just stand a chance.

10 shots fired by a Raven Shield operative



Tom Clancy's RAINBOW SIX 3 RAVEN SHIELD™

Counter measures are key

There are three different types of counter-measures to the heartbeat sensor.
Knowing when to use each of these can mean the difference between life and death. A nice trick is to use one of the heartbeat sensor jammers to hide your team mates, while deploying a fake heartbeat. Sneaky. Very sneaky.

Choose your weapon carefully

With 58 weapons to choose from, as well as various scopes, silencers and other accessories, picking the right weapon for the map is a must. If you're covering a short range area of the map, a submachine gun or shotgun is appropriate - save the assault rifle, sniper rifle and HMGs for larger sections.
Whether or not you choose to silence your weapons depends on your style.
Remember that the value of not being heard can often outweigh the weakness of silenced weapons. An unaware enemy doesn't shoot back, or alert his buddies to your position.

Lean on me

An invaluable feature within Raven Shield is the ability to lean around corners. This allows you to check a corner without exposing your body mass, presenting a much smaller target to the opposition. You can do the same with crouching, and peak above a barricade to get a bead on the bad guys.

As real as it gets

Because Raven Shield is so realistic, using the same tactics that the real world teams use is highly recommended. Consider splitting your four man team into two fire teams. You can then successfully use cover and move tactics. Set up ambushes for your enemy with claymore mines or remote charges, and lure them in to the kill zone. You'll have to think long and hard to survive.

If you keep these basic tips in mind, you'll be well on your way to being a competitive combatant. Of course, when you're staring down the length of your MP5 at the enemy, it all comes down to skill. So, start practicing now. . . before you end up dead.

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Complete Game Guide

Ubi Soft

Red Storm

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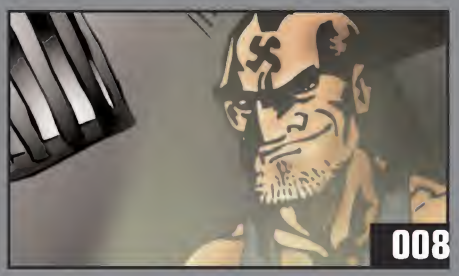
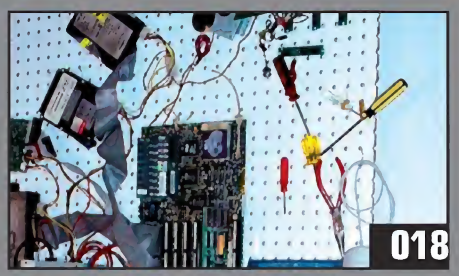
ATOMIC CONTENTS ISSUE 28 MAY 2003





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Welcome to the House of Box. We box boxes from the finest boxes in all of Boxland. So, stay awhile. . . stay forever!

GEAR BOX 020

Related to cars in no way, and showing off some nice kit from places unknown, Gear Box is Cream Central.

Blu-ray 022

Even though it's cool to think a laser beam can blow up buildings, they really can't. They can read CDs though. . . and keep household pets entertained.

I/O 074

We've reloaded the Dan-o-Matic for another issue of shooting troubles. Crack shot? No, we just use big-arse rounds.

H2H: GPU vs CPU 026

It's no mystery that CPUs have sped up faster than a hyperactive polymorphic dinosaur on LSD, but how about those power-hungry GPU things?

FEATURE: Centrino 034

At the moment, we need wires to hook things together, as well as keep our chickens in one place. But Intel has flown the coop and introduced its global wireless solution. So obey!

TUTORIAL: Embrace de bug 078

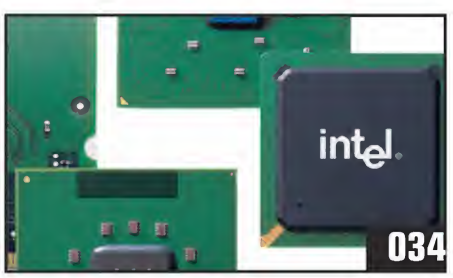
No one wants to see you hugging an insect, unless you're playing Starcraft and you need to get cuddly with a Zergling.
Get back to base and fudge with your system soldier!

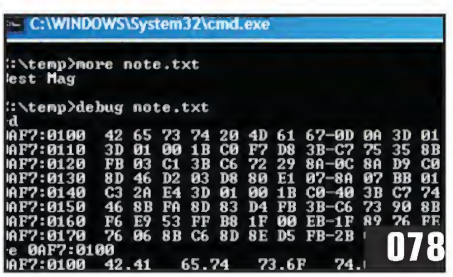
TUTORIAL: Aural Decipher part 3 080

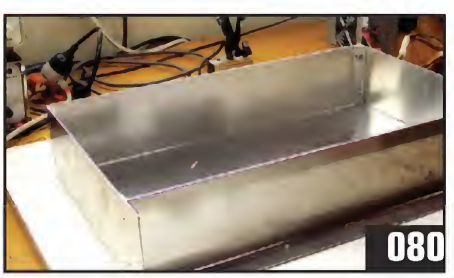
Eating PCB of late? Check out Mark's Aural Decipher. You can stop chomping Silicon, *and* make a great MP3 box as well!

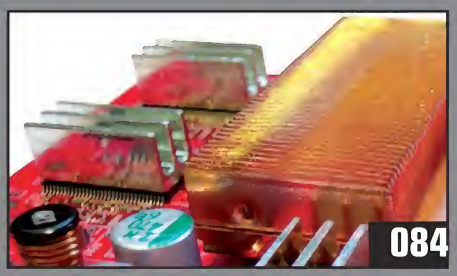
POST APOCALYPSE 088

Word.









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Climatic. It's that exciting. And tweaky.

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Want cool graphics? Get yourself a chunk of Copper delight and soothe the burning soul of your GPU.

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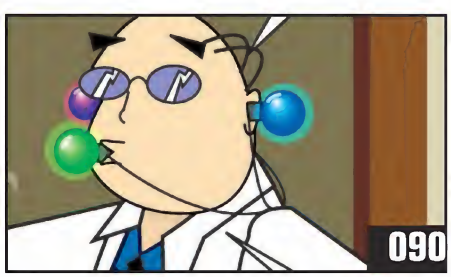
Complete? Compass? Computer? No silly, it's competitions!

FALLOUT 090

You'll like what's crashed into the last page. Really.



Atomic Inn

G'day. Welcome to *Atomic*. Your sanctuary from the ugly outside world. It's nice in here, eh? A happy place. A place where you belong. Your place.

It's always been your place. Knowing that is what drives us, the caretakers of your place. Sometimes we read other magazines and it seems to us that, as readers, we are intruding into someone else's place. And that's just frucked.

As caretakers, we've done a bit more sprucing of your place this month. Little things which are big.

Down the back end, we've done a bit of small-yet-radical surgery. We're sending *Captain Atomic* on a long holiday for a well-deserved break. Now, tucked in under *Fallout*, you'll find *Crashtest*. Many forumers will be familiar with the *Atomic Labs* cartoons that Atomican evilbasta did.

They are bloody fantastic. We loved them and we knew instantly that *Atomic Labs* was what we needed for *Fallout*. But, we didn't want to do a cartoon based on ourselves, because that'd be a bit too much of a public wank and we just don't love ourselves that much. That's our Mums' job.

Over the last couple of months we worked with evilbasta to develop the *Crashtest* universe and characters.

We'll miss the Captain, but he's not dead or anything, unlike Superman, as a superexample.

Not dead yet, too, is our new designer, Tim McPherson. In fact, he's so not-dead it's not funny. He loves it here (don't you Timmy. . . !) And what (or who) is not to love? Tim has the talent and passion to make *Atomic* betterer than it already was. Nothing radical is going to change –fear not! But we're filled with joyous confidence because Tim's a truly great designer and he loves his games and tech. Can't beat that.

Speaking of arty design, *Artomic* is going off! As you can see. We always knew that Atomicans had crazy, beautiful imaginations and the art we're seeing is stunning. Check it out for yourself in the *Games* and *Reviews* intro pages. And have a go yourself. Get the recognition you know you've always deserved. Get international exposure in a globally fabulous magazine! Win great stuff! Email a pic (no more than 5MB) to artomic@atomicmpc.com.au and we'll be in touch if we like what we see. Be prepared to supply a phat 300dpi version. Or just post us a CD with the full version if you like.

See? We've packed even more Atomican into *Atomic*. But that still wasn't enough. That's why we've included the new LAN and online gaming news column, Aus Egamer, into the news pages. That's a regular gig for Atomican Mordain. A mild-mannered and reserved lad, loved by his teachers and babysitters, Mordain tends to get aggressively emotional at the merest suggestion that competitive gaming isn't the most important thing in the universe. Ever. The right Atomican for the job, surely.

Just before I go, it is only right that I draw your attention to the latest phenomenon to hit the Internet since the Dancing Baby. Teaming up with ITV World and Telstra, the *Atomic* boys are doing weekly Internet TV shows.

We're really bad at it, but we're figuring that, seeing as Internet TV is the future of TV-TV, then we can only grow with it all. We're doing two shows a week at the moment at http://telstra.com/multimediaguide/html/subsection/games/index.asp

If they sack us before you take a look, I can only apologise for having wasted your time! Wey hey!

Have a great month!

Ben Mansill
Editor

atomic
MAXIMUM POWER COMPUTING

EDITORIAL
Editor: Ben Mansill bmansill@atomicmpc.com.au
Technical Editor: John Gillooly jgillooly@atomicmpc.com.au
Reviews Editor: Bennett Ring bring@atomicmpc.com.au

DESIGN
Designer: Tim McPherson tmcpherson@atomicmpc.com.au
Product Photography: Michael Frey photo_grapher@optusnet.com.au

CONTRIBUTORS
Daniel Rutter, James Wang, Tim Dean, Ronald Marc, Ashton Mills, Lachlan Newman, Simon Peppercorn, Ron Prouse, John Simpson, Mark White, Dr Carlo Kopp, Stuart Denham, Ty Pendelbury, Steve Polak, Clare Enright

PRODUCTION
Head of Production: Angela McKinnon amckinnon@atomicmpc.com.au
Production Coordinator: Melanie Whitfield mwhitfield@ajb.com.au
Sub-Editor: Stuart Ridley sridley@atomicmpc.com.au
Junior Sub-Editor: Logan Booker lbooker@atomicmpc.com.au
Traffic Coordinator: Jamie Dickson jdickson@atomicmpc.com.au
Subscriptions: Eileen Chong echong@atomicmpc.com.au

Printed by PMP Print. Distributed by:
Gordon & Gotch Australia (03) 9805 1650
Gordon & Gotch New Zealand (09) 625 3005

ADVERTISING + MARKETING
t + 61 2 8399 3346 f + 61 2 8399 3622
Strategic Accounts Head: Andy Jackson ajackson@atomicmpc.com.au
National Advertising Manager: Cathy Snell csnell@atomicmpc.com.au
Sales Coordinator: Joveline Bascon jbascon@atomicmpc.com.au
Account Manager : Alex Harding aharding@atomicmpc.com.au
Marketing Manager: Kate Imberti kimberti@atomicmpc.com.au

AJB PUBLISHING
t + 61 2 8399 3611 f + 61 2 8399 3622
Unit 2–5/44–70 Rosehill Street, Redfern NSW 2016 Australia
Managing Director: Adrian Jenkins ajenkins@atomicmpc.com.au
General Manager: Simon Corbett scorbett@atomicmpc.com.au

SUBSCRIPTION ENQUIRIES (INC. CHANGE OF ADDRESS)
Aust – t 02 9879 4915 e subscriptions@atomicmpc.com.au
NZ – t 09 625 3005 e rricketts@gordongotch.co.nz

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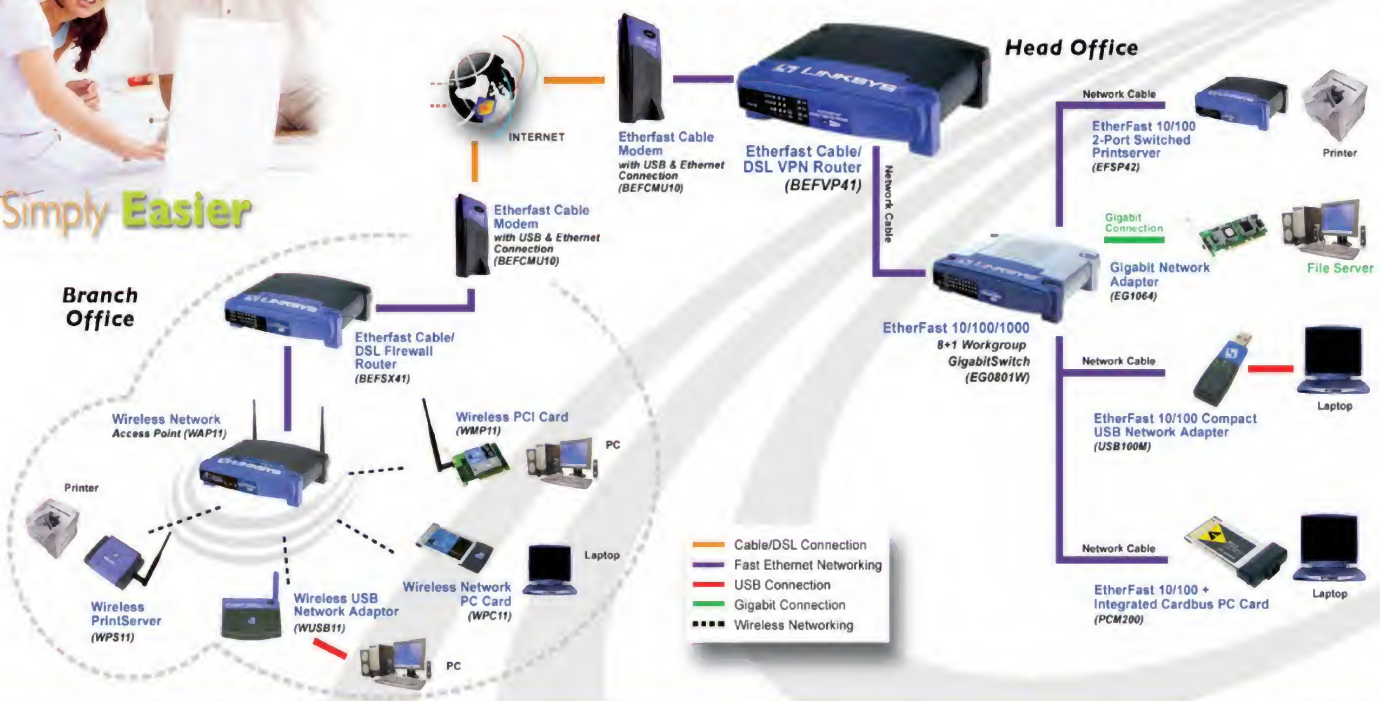

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SHORT CIRCUITS

300mm wafers and .09-micron are cutting-edge fabrication techniques, but are falling off the economic feasibility chart. The problem is that building just one of these fabrication plants costs in the order of US$4 billion dollars and will need around seven billion in sales to keep it running. In stark contrast, TSMC scored only US$4.6 billion last year. The Semiconductor Summit concluded with many doubting the sustainability of Moore's Law in an economic sense. Many small fabs are expected to be squeezed out this year.

During production of *issue 27*, the fibre optic lines between editorial and design were severed by a stealthy commando raid. As a result, several Hot Award logos went AWOL. The following motherboards should have been hotted up: Soltek SL-75FRN-L, MSI K7N2G-ILSR and the ASUS A7N8X-Deluxe. Also, the following sound cards should have received Hot Awards: Creative Sound Blaster Audigy, Sound Blaster Audigy 2 Platinum and the Sound Blaster Audigy 2 Platinum EX. Finally, the Videologic SonicXplosion DVD sound card can be purchased without the DVD software for $179. Bargain.

We have seen a few GeForce FX Ultra cards in the Labs, but so far zero on store shelves. The *Atomic* spy ring reports that this is due to ultra low yields of the chip, meaning NVIDIA has only been able to produce 60 cards a week. This will change with the announcement NVIDIA will use IBM's East Fishkill fabrication plant in New York State to make the chips in a three-year deal that will also give NVIDIA access to IBM's 90nm and potentially it's 65nm SOI process. TSMC will still be making chips, but we foresee most high end production going to IBM.

Dead man talking

'Caring, affectionate, good natured and romantic man seeks women 18-25 for fun times and romance. Good looking and honest, with a warm heart and considerate attitude. Currently on Death Row for three counts of first degree murder and two counts of assault.'

Sound like fun? You can email this person and many others just like him.

Maybe you just want to see the Web pages of a few Death Row inmates? Or read their heart-felt stories of innocence?

Across the US and Canada, inmates are turning to the Internet to while away the hours as they do their time.

You can engage in email-based pen pal type correspondence, look at photos of Death Row inmates and read their poetry, or even listen to the inmates speak through Real Player.

Email sent to the inmates is never directly received. Instead it is received at a central location, its content scruitinised for appropriateness and then forwarded to the inmate. Any replies from the inmate follow the same process.

Some inmates are simply looking for people to share correspondence with, happy with being able to communicate with people other than those they spend their relative isolation with. Other inmates will tell you their story, for a few bucks. Others use the services to protest their innocence, and one or two have actually had their sentences commuted or convictions overturned as a result of their online campaigns.

Inmates in Australian correctional centers don't presently receive these types of services.

LINKS

The Canadian Coalition Against the Death Penalty www.ccadp.org
The Pampered Prisoner www.thepamperedprisoner.com
Cyberspace Inmates www.cyberspace-inmates.com/death.htm

Mobile Bananza

Never before has there been such a frantic month in the mobile computing arena. Intel's long-in-the-making 'Banias' mobile CPU was finally unveiled in March. Commercially launched as the Pentium-M, it is part of the notebook technology package called 'Centrino'. Coined off the virtually massless tiny subatomic 'neutrino', it literally changed every billboard overnight to its logo's magenta and blue hues. By forking out over $300 million in marketing, no doubt Intel is seeking to hammer in the name as the mobile equivalent of the Pentium. The Centrino package includes the Banias-based CPU, the motherboard chipset and an integrated 802.11b Wi-Fi controller. The CPU sits architecturally somewhere between a Pentium III and a Pentium 4. Other than the ground-up design for low power usage, the most notable difference is the massive L2 cache, which is twice that of the Northwood cored Pentium 4 at 1MB.

With the 0.13-micron process at TSMC now smooth as potato pie (although low-K technology is still not available), ATI and NVIDIA are leveraging this to bring DirectX 9 mobile GPUs to the market. ATI's execution is now more aggressive than NVIDIA at its peak (GeForce 2-era) with the launch of three mobile products right after its major desktop push. The flagship MOBILITY RADEON 9600 PRO is clocked over 350MHz and uses the funky GDDR2-M memory, which is optimised for higher clocks and lower power consumption. NVIDIA's launch was on the same day, and announced mobile equivalents of the 5200 and 5600 GeForce FX chips, at 300MHz and 350MHz mobile core respectively. Let's hope NVIDIA executes better this time around compared to its paper launch for the 4200 Go last September. With four DirectX 9-class GPUs to choose from, and Centrino on centre stage, mobile gaming and 3D work on the road are now every bit as real as their desktop counterparts.

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Enjoyment Matters

AUS EGAMER

This month saw the GameArena CS ladder draw to a close with unstoppable Melbourne powerhouse Unknown Individuals defeating fierce rival Efficiencia Ex Infernus in humiliating fashion. Ui showed it is a serious force to be reckoned with in the upcoming year of competition with an outright score of 13:0 on dust2.

Other clan-related news saw the splitting of EXi's starting five into the newly formed everglide.au team. With big names like Dim, Mr. P, Cracker, Zevier, I C E and JIN, and the support of Everglide Australia, this could be the clan to rival Ui for top spot in the Australian CS scene.

Big competition news of the month came from the European Cyberathlete Professional League tournament in Cannes, France. Even with big names like mtw.atn, Four Kings and Matrix not in attendance, the competition proved one of the most exciting of recent times.

Swedish team Schroet Kommando proved it had exactly what it takes to be number one, gliding through the competition with apparent ease. Meeting [9].esu in the final SK.swe managed to pull off a brilliant terrorist side on de_cbble to come away with a 13:5 victory. Final standing saw SK.swe on top with [9].esu in second and German team mouz coming up third.

Although without the fanfare of CS, Warcraft III proved itself the highlight of Cannes. SK.swe secured a true multi-game clan with SKInsomnia blasting through the field early. With some of the closest matches yet seen in competition, SK.swe was denied the double-championship by aTIntoX.

SkInsomnia took out second with DIDI9[pG] and eSu.Soul rounding out the top four.

A big surprise of the competition saw international star 4K^INTillerMaN forfeiting his matches due to non-attendance. When asked what he thought of Australia's chances for WCG this year he responded with by referring to Australia's number one, Raggy: 'GL to him at WCG Australia, unfortunately he won't be able to compete against me in Korea – he won't even qualify.'

With rivalries like this and Australian competition heating up, this is going to be one hell of a year in Australian, and indeed International pro-gaming. GL HF.

Mordain

Overclock lock

Everybody loves Intel. Since waging a price war with AMD, its CPUs have become much more competitively priced, and the continuing onslaught of its technical expertise has left the Athlon architecture looking decidedly dated. Its chips also tend to be more overclockable than AMD's chips, swinging many tweakers towards the dark side. Unfortunately it appears that the great fondness overclockers feel towards Intel could soon go the same way as Intel's multiplier unlocked processors.

Patent number 6,535,988 could turn out to be one of the most despised patents ever lodged; send all your hate mail to a certain David L. Poisner, the demon behind the patent. Lodged by this Intel employee, it describes a technique that has one purpose and one purpose only – to stop the overclocking of the CPU. Gasp now.

Thanks to a detection and prevention circuit, this technique allows the CPU to 'know' when it's being pushed faster than its rated speed. It then goes into super-sloth mode, cutting performance dramatically. Not a good thing.

Intel claims it is introducing this technology to prevent unscrupulous PC retailers from selling lower-speed CPUs at a higher-clocked speed. Yeah right. When's the last time you ever heard of this happening? Considering Intel locked the CPU multiplier several years ago, we haven't heard of a single retailer being sprung for this devious scheme. So who is Intel targeting?

Well, how many people do you know that are currently running Intel's 3.06GHz Pentium 4? You can probably count these people on the fingers of an armless man. But how many people do you know who run a slower speed Intel CPU, overclocked to around the 3.06GHz mark?

So Intel could well be missing out on sales of its highest speed (and profit) CPUs to one of the sectors most likely to purchase them – gamers.

There's still no guarantee that this technique is going to be implemented - the patent was lodged back in 1999, so hopefully this is an indication that it's not going to be used any time soon.

atomican

It's all one big conspiracy I say. Hollywood, The Illuminati, *Atomic*, and the people who make fluffy dice are all in on it! I'm not talking some silly 8march2003.com crap; I'm talking about the real deal. Taking over the world, big brother, controlling the population, trippy shit.

The first part of their plan, which I have uncovered, was that the real way that they come up with Hollywood movie titles, is simply to take *Atomic* usernames, and swap-a-roo them around a bit. I've started compiling a list (www.atomicmpc.com.au/forums.asp?s=4&c=14&t=109) and with the help of other Atomicans, we're just starting to see how deep the rabbit hole goes.

The second stage for world domination involves the atomic IRC channel. It seems that every Tuesday night (www.atomicmpc.com.au/calendar.asp) there is a theme discussion on various topics. Is Tuesday night when they have their secret meetings because they know everybody will be at their computers in IRC?

Thirdly, I believe that they are using the Fanta Bollywood movies to transmit secret messages, or even subliminal advertising. Just take a look at www.fanta.dk/showmovie.asp?mid=899E9C27-EB70-456A-B8F1-28F78619B5D7 and you'll see what I mean.

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=6237 shows how addictive it can be. BTW, I wish I had some fluffy dice right now!

The next step of their plan involves some kind of m337ing of Atomicans in Newcastle, which was held last month. Alcomohol was had, and fun was available to all. There are even plans by these Newcastle Atomicans to make it a monthly event. Are they in on the conspiracy or just a chance co-incidence? You decide.

In fact, there is even a whole part of the forums dedicated to organise events to get us away from our computers and into the real world. Pointing your browser at www.atomicmpc.com.au/forums.asp?s=1&c=5 and you'll see the evidence. First they want to keep us at out computers, and then they want us away from them? Sometimes I can't understand these wired secret societies!

So Atomicans, be alert, but not alarmed, always ask yourself, who is the more foolish? The fool, or the fool who follows him to Iraq?

Wilkshake

What's hot

- **VIA EPIA – The C3 finds its niche**
- **GeForce4 Ti4200 – Still NVIDIA's standout**
- **Freelancer – Fresh air for space shooters**
- **Personal spy cams – Bathroom fun**
- **Impossible Creatures – still mutating**

What's not

- **VIA KT400 – Second place still**
- **GeForce FX 5800 Ultra – Still a rarity**
- **MOO 3 – Space's darkest hour**
- **Public spy cams – Restroom terror**
- **JBL Creatures – should be muted**

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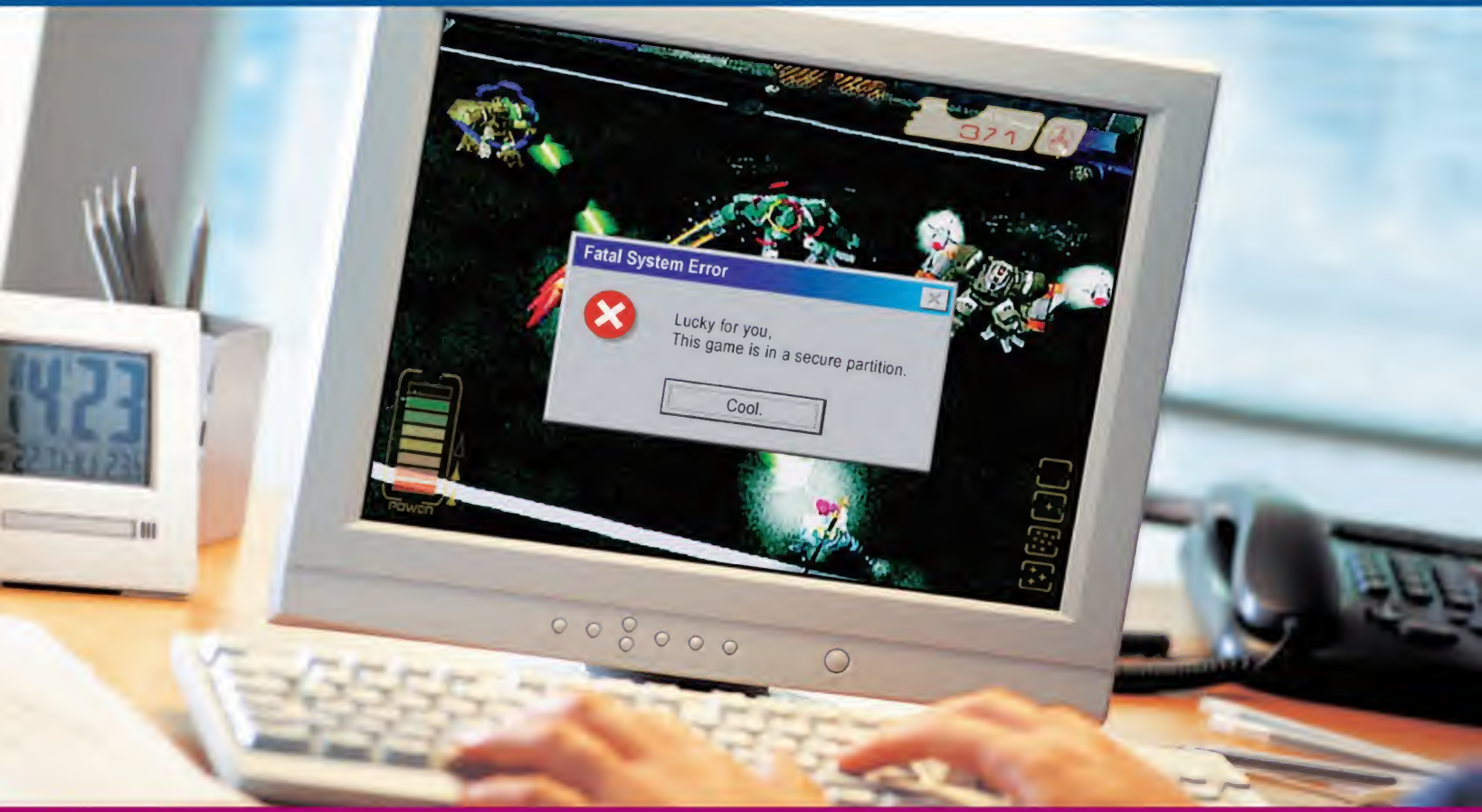

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26032

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When PCs die...

Australians will send 1.1 million PCs to landfills this year. Ashton Mills digs deep to discover what happens to them when they die.

You have wonderful memories of your previous precious PCs: they gave you so much joy and so much *love*, there is no doubt in your mind that they go to computer heaven when they die. Right?

I have this nostalgic collection of components. There are the sleek red lines of a Gravis Ultrasound *and* a Gravis Ultrasound Max, the first wavetable cards in the world. A Voodoo1-based Orchid Righteous 3D that first taught me the orgasmic joy of accelerated 3D. A BX-based motherboard so arcane that it doesn't have an AGP slot. A couple of ancient hard drives, including a 500MB beast which I used to bounce off the bed like a basketball to get it working when it would refuse to spin up (the bearings would shift, giving freedom to the drive a while longer). And this is just the tip of the pile.

Somewhat to its detriment, computer hardware is a resilient technology. Integrated circuits just don't wear out and fall apart the way clothes and cars do. My collection includes a classic steel chassis IBM AT keyboard so resilient that centuries from now it'll be dug up and displayed in a museum for 'oddball interface designs of our ancestors'.

So what do you do with old hardware? Throw it out? I hope not, because PCs don't go quietly to the grave. PC components are not environmentally friendly – in fact, they're downright toxic. When they're crushed up in landfill their chemical cocktails can seep into the groundwater, poisoning plant life, animals, and eventually us.

The current rapid rate of development in technology will see some two million PCs made obsolete *every year* in Australia. A portion of these will be re-used (around 25%), a measly amount will be recycled (around 1.5%) and the rest will end up as landfill or in storage (eventually destined for landfill anyway).

America solves this problem by shipping a fair chunk of its computer waste to China, thanks to that nation's lax environmental laws. The junk ends up in villages where peasants heat up the components to remove valuable metals they can sell to make money. This story made the news last year when it came to light the chemicals that make up electrical components had poisoned entire villages. It's interesting to note that the Basel Convention, activated in 1992, was put into force to regulate and minimise the flow of hazardous waste, including computer waste, from developed countries to developing countries, and that America was the only developed nation that refused to ratify it.

The junk ends up in villages where peasants heat up the components to remove valuable metals they can sell to make money.

But it's a global problem. Europe recognises that it's fast coming to a head and has set the WEEE (Waste Electrical and Electronic Equipment) directive for manufacturers who wish to sell in the EU to find replacements for the hazardous chemicals that make up computers and electrical components by 2008.

What chemicals exactly? Oh just the usual poisonous and carcinogenic crew: Lead, Arsenic, Aluminium, Beryllium, Mercury, Chromium and Cadmium to name a few, along with chlorofluorocarbons and brominated flame-retardants.

Lead has already been banned from fuel and paint products years ago due to its toxic effects on the nervous system (which in children can cause brain damage), yet according to Environment Australia (www.ea.gov.au) the average 15in monitor has some four pounds of lead in it, which inevitably ends up in landfill somewhere.

And mercury? Just 1/70th of a teaspoon can contaminate 20 acres of a lake, making fish unfit to eat.

This is what we're throwing into our landfills at a rate of one million PCs a year. In fact, EA estimates that by 2006 there'll be at least 7,000 tonnes of hazardous materials entering our landfills due to computer waste. At the same time another five million outdated PCs, and possibly some 100,000kms of cabling (internal and external), will be in storage awaiting the inevitable trip down to the rubbish tip.

And just to brighten your day, EA notes that these are conservative baseline figures and that the total values could be much higher.

The AIIA (Australian Information Industry Association) instigated a trial computer recycle program, called Recycle IT!, in Sydney's West from November last year to March of this year for the responsible recycling of computer parts. The results of this trial will be indicative of Australia's future success in the recycling of our ever-building computer waste. But aside from this, there have been few initiatives to tackle the problem.

Until our Government comes up with a viable recycling initiative that involves manufacturers taking responsibility for the end-of-life of their products the bottom line is that we, as consumers, have the power to make a difference here and now – don't throw your old gear out, instead first try and reuse it: build yourself a Linux gateway to play with or a lounge MP3/Ogg/DivX playback box; build a machine for your relatives to get online and hang out in #atomicmpc; turn that old Pentium or RAM stick into a piece of attractive jewellery! ('See this P100? Yeah, that's what I used when I owned you in Duke Nukem 3D!')

Failing that, recycle it. There are a number of organisations that will take your gear for others to put to use, such as www.pcrecycling.org.au, which sends refurbished gear overseas to less developed countries where even a simple P100 is like gold and can make the difference to a school or hospital.

The problem of computer waste pollution is here and now, and you can do something to reduce it. When the upgrade path comes send your old gear to be recycled, and perhaps to even travel the world.

Cheat death.

Cool...

Very Cool !

atomic HOT

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- Integrated Cooling Engine(ICE Technology)

SB51G

- Support Intel Socket 478 Processor with FSB 533 MHz
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- Integrated Cooling Engine(ICE Technology)

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Benchmarking: art or science?

'I call this the distinction between testing for the kit, or testing for the people,' says Tim Dean.

Before I get stuck into my diatribe on benchmarking, I'd first like to dip my figurative hat to Francis Bacon (1561-1626). Now, he was a champion.

Before Bacon's time, the prevalent method of investigating nature was either religious-based, such as with scholasticism (the *cough* somewhat oxymoronic *cough* fusion of theology with reason), or humanism (Renaissance humanism, which was the belief that the Greek thinkers, mainly Aristotle, were wearing the intellectual pants, and that's all you needed).

Then Bacon came along with his cheekily named 'Novum Organum' (or 'New Organon' in English, which means 'new tool', and was cheeky because it flies in the face of the humanists by referring to Aristotle's original 'Organon', implying Bacon was replacing Aristotle's old tool with a new and better one).

The New Organon promoted a new way of studying the world, which uses rationality, experimentation and inference to draw conclusions about the way the world worked. This new method has become known as empiricism, or the study of the world using our senses, and not through rationality alone (which is known, funnily enough, as rationalism).

Right, enough of the history lesson.

So, what does Bacon have to do with benchmarking? Well, Bacon's beef (heh, pun) was that experimentation was the way of the future – and that principle holds very true today in what we do in the *Atomic* Labs.

As you well know, you can study the specifications and architecture of something until the cows come home (heh, another reference to beef), and you still won't necessarily know whether one piece of kit is better than another.

I certainly don't need to tell you the kind of malarkey the likes of AMD, Intel, NVIDIA and ATI spout about their tech, and why it is superior on the merits of specs alone. . .

That's why we test stuff.

Last month John wrote a very interesting piece in his *Reviews intro* about benchmarking, synthetic versus real-world tests and 3DMark03.

The debate over the best way of testing something has raged for as long as things have been tested, and John has summed up some of the most poignant points in his article.

What I'd like to talk about is another old chestnut of benchmarking, and one that John touched upon in his piece.

Talking about the way of the future – this issue is whether one should test something using benchmarks that are representative of the way that product is used today, or whether you test it to show its maximum potential, which might be in the future. For example: do you test today's graphics cards with DirectX 9 benchmarks, or with DirectX 8?

I don't need to tell you the malarkey the likes of AMD, Intel, NVIDIA and ATI spout about their tech, and why it is superior on specs alone. . .

The cards are designed specifically with DirectX 9 in mind, and are explicitly optimised for it, yet if you use the card today, it will be running games that are written, and optimised, for DirectX 8.

I call this the distinction between testing for the kit, or testing for the people. When you test for the kit, you use the benchmark (or application) that pushes it to its limit and shows its maximum potential. This way you get a good indication of what the product is really capable of when going lickety-split.

On the other hand, that test might turn out to be totally irrelevant in the real-world because, depending on how it is actually used by actual users, it might never reach that potential.

Again, I don't have to tell you about the MIPS (Millions of Instructions Per Second) myth – that just because something runs at *X* MIPS at maximum speed doesn't mean it will actually run at *X* MIPS when running real applications.

Testing for the people, on the other hand, is the principle of looking at how that product will be used in the real-world, and testing in an appropriate manner to show how the product performs doing that task. The benefit is that you get a relevant figure that tells you exactly how that product performs relative to its competitors when running the tasks you really use it for.

It's like if you play a lot of Quake 3 then it makes sense for you to test the latest GeForce FX and RADEON 9700 PRO in Quake 3 at the settings that you actually play with.

The down side is you might never push the technology to its limits, so you'll never know its full potential.

You also have issues such as the DirectX 9 one. When you buy a product, you want to know if it has legs – or in marketing parlance – whether it's future-proof. If you're going to own a product for a couple of years then you'll want to know how it will perform in tomorrow's applications as much as how it performs in the applications of today.

You might get a case where the RADEON 9700 PRO is faster in today's games, but the GeForce FX will be faster in the games that are released one year from now.

The challenge is that testing for tomorrow's applications is inherently speculative, because, well, the applications come out tomorrow, and aren't here today. That's why we cheat.

Well, not exactly. But that's why we try and anticipate what tomorrow's software will be like, and test accordingly. That's why we test using DirectX 9 today even though its support is nominal today.

At the end of the day, there's no *one* right way of doing things. At *Atomic*, our mission is to give you the information you need to determine whether a product is worth you forking out your hard-earned, and to tell you about the tech guts of it – so we have to swing both ways on the benchmarking gate.

And, don't get me started on Intel and the shenanigans of benchmarking the bloody Pentium 4. . .

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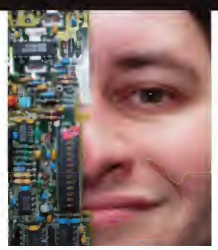
Invisible miracles

For roving mobs, the pitchfork was a great technological advance. Daniel Rutter wonders what's really shaped modern society, other than the Poptart.



When you ask someone about the technological advances that have shaped society, they tend to think of big-ticket items. Jumbo jets. Nuclear medicine. And, of course, computers.

Big-ticket technology certainly *is* influential, of course. But things that you do, use, or see so often and so automatically that you hardly consciously perceive them at all are often *more* influential. You only notice the ubiquitous and invisible when it changes. And it's going to.

Some data processing technology is now ubiquitous and invisible; people don't really notice the featherweight computers that run traffic lights, for instance, unless they're making sure that their car is directly over the induction coil, or wondering why the darn lights never change for their motorcycle.

Tech of this sort is sneaking into life everywhere, but we'll be waiting a little while for common everyday low-cost goods that include piezoelectric orientation sensors, close-range wideband ad hoc networking and self-location capabilities using pseudo-fractal multiresonant antennae and arbitrarily reconfigurable software-based radios, all connected to printed-on reflective or even illuminated displays and distributed-mode loudspeaker technology. When we have that, then a light bulb, a can of beans or a shoe will be able to talk to you.

All this sounds about as sensible, right now, as tying a P4 motherboard to every bunch of broccoli. But using a laser to entertain a cat didn't sound too rational in 1963, when lasers were neither man-portable nor affordable by most of the world's corporations.

Dirt cheap diode lasers, though, made possible the evolution of the whole world of optical disc technology, as well as being useful in builders' levels, barcode scanners and cat toys.

Once the tech gets cheap enough for input, output and processor to be stuck on or in a product as cheaply as anti-theft tags today, Stuff Is Gonna Change.

The very definition of 'invisible' will change, too. Computer user interfaces will become invisible, partly because gangs of disgruntled users carrying firebrands and pitchforks will storm the homes of most interface designers (hey, I'm allowed to dream), and partly because users will consider even quite obscure interfaces to be as obvious as a steering wheel is to most of us today.

There are now kids in *second grade* who weren't yet *born* when Windows 95 (or, if you prefer, Mac OS 7.5.2) was released. Command-line-only computing is to them as the Apollo moon landings are to a 25-year-old, but the unspeakable ghastliness that is the text messaging interface of a mobile phone (even *with* predictive freakin' text, if you ask me) is, to them, perfectly sensible. Throw an interface at them, and they'll master it in minutes, no sweat.

Using a laser to entertain a cat didn't sound too rational in 1963, when lasers were neither man-portable nor affordable by most corporations.

To them – and, with luck, to the rest of us – lots of things that are ubiquitous and invisible today will seem intolerably quaint, because new and easier ways to do them will have arrived.

Take keys, for instance.

Well, mechanical keys, anyway.

'But, Grandpa, what if you dropped the key down a drain?

What if it broke in the lock? What if someone stole it?

What if someone glued the lock shut?

What if it was dark and there were 23 keys on your key-ring?'

'Well, all of those situations pretty much sucked.'

'What does 'sucked' mean?'

Mechanical keys will be with us for a long, long time, but digital solutions will encroach on them more and more.

Keys will still, I think, generally be a physical object that you carry with you; biometric authentication systems (fingerprint, retina pattern, voice ID. . .) have some serious basic problems. Not the least of them is that if it's at all possible for someone to pretend to be you, biometrically – to 'copy your key', so to speak – then you face the not inconsiderable problem of running out of fingers, retinae, voices and so on.

But your 'key ring' may well be just one ring, which you wear on a finger.

Heck, look at www.ibutton.com – we're practically there already.

If rings, brooches or necklaces don't do it for you, we can always turn to implants. Implantable ID devices may get the *Revelations Chapter 13* crowd very excited indeed, but little rice-grain implants used for the sorts of jobs that metal keys currently do have considerable appeal.

You'd never forget or lose one.

Let's not think too hard about what it'd be like if someone decided to steal one from you, though.

Another example: magazines.

Of the non-subscription copies of *Atomic*, at least half never get read.

It's a basic paper-publishing rule of thumb that if you're selling more than half of the magazines you print, you need to print more, because a significant number of newsagents are statistically likely to be running dry.

Distributors try their best to get a sensible number of copies to each newsagent, based on past sales, but the stats aren't available quickly or they aren't very predictive. Hence, a whole lot of unsold, and then pulped, *Atomics*.

It's hideous.

Right now, electronic books are not a general-purpose alternative to paper books and periodicals. Not enough screen resolution; not durable enough; too expensive; not enough battery life. . .

When all that's solved, though, the advantages of magazines and of Websites will all be available in one device, and your room full of back issues will fit in your, um, 'E-Mag'.

Which will leave us all with a whole room free.

Which we can fill with more hardware.

Anybody got a problem with that?

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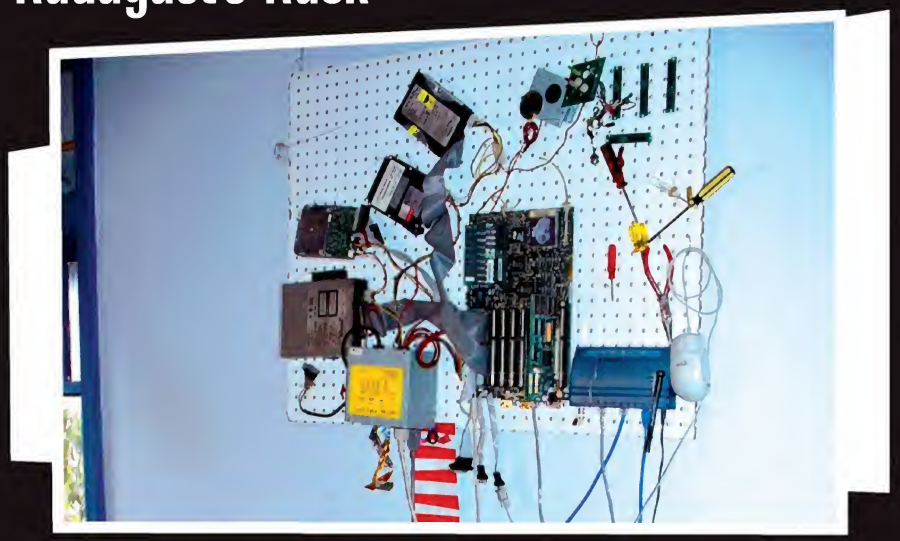
Radagast's Rack



Technical details
- Pentium MMX 200MHz @ 166MHz
- 32MB RAM from various old computers
- 12GB HDD (5GB system; 7GB home)
- 240MB HDD for automated backups
- 10/100 NIC
- 8MB video card, almost never used
- Pegboard from the hardware store
- 0.9mm fencing wire
- Old shielded electrical wire for the motherboard
- Lots of fishing line and three hooks to keep it all up
- RedHat 6.2 (soon upgrading to Debian 3)
- Network admin via VNC
- Various tools

The story:

My brother is a carpenter. He has a shed full of tools hanging on those boards that carpenters have. I'm jealous –like all *Atomic* readers, I want to see my hardware.

This is my Linux server. It backs up our work while we sleep and it was our firewall when we lived with broadband. I had the case open so often that it seemed redundant, so I got a pegboard from the hardware store and wire and rubber bands and string from the kitchen. The first step was to spread the computer on the floor and think about topology.

The power supply needed to be in the centre, because it connects to everything else. I have a keyboard, mouse and video card, but I never use them because the network is the computer. I hadn't included the speaker or LEDs, but I plugged them in because I need some direct feedback from the machine.

It's as good as any piece of art, and I'm surprised how many people look at it and say: 'Wow, you know you could probably have a computer like that which actually worked. . .'

Scared Little Guy

Technical details
- Pentium 4 2.4 @ 2.61GHz
- 512MB Kingston DDR333 CL2
- Gigabyte Titan 8PE667
- ASUS Geforce4 Ti4200 128MB
- 40GB Seagate Barracuda ATA IV
- Lite-On 52 x 24 x 52 CD-R/RW
- 56K Netcom internal voice/fax modem
- Stock Intel fan (blades painted with UV-reactive paint)
- Rear fan (blades painted with UV-reactive paint)
- Cold cathode black light
- EL wire
- 3DMark2001SE Pro score: 11324

The story:

I started this mod some time ago after flicking through one too many *Atomic* mags. The case was picked up off a mate for zero dollars because it had a faulty power switch, which was fixed in minutes.

The planning was all done in Photoshop to get the colours, pic and window position just right. The pic had to be made up of simple lines and limited colours to make transferring it to the case easier. I took a liking to the 'scared little guy' from the pennyarcade.com. Placed on the side of the case, he looks scared of the awesome, throbbing, glowing, power coming from the parts inside the window.

The side panel was covered with masking tape and the window measured out carefully. Four holes where drilled in each corner.

Grandpa's jigsaw of death was let loose followed by a bastard file, Wet & Dry sandpaper and wham, bam, thank you –the perfect window hole. The case was sanded and spray-painted navy blue eight times.

WIN WITH COMPUCON

The Dog Boxes

Technical details

- MSI K7T Turbo motherboard.
- AMD Athlon 1GHz AXIA @ 1.4GHz
- 512MB SDRAM
- Leadtek GeForce4 MX440SE.
- One 40GB HDD
- One 60GB HDD
- 18mm-thick clear acrylic sides
- Engraved *Atomic* logo on both sides.
- Light box at base containing 12in cold cathodes
- Custom water-cut brackets
- Piezo-electric on/off & reset switches
- One 120mm and one 80mm fan.
- Windowed 2GB HDD (that works!)
- Aluminium used in construction

The story:

Ghost Dog and myself (TwoDogs) thought: 'Why put a window in a case, why not make a case look like a window?'.

We also wanted it to look minimalist and industrial. With this in mind we set out gathering all the relevant component standards off the Net. The case was completely designed and drawn in 3D using AutoCAD, and detail drawings were then produced. This AutoCAD file was used to engrave the acrylic sides, mill the slots and water-cut the brackets via CNC (Computer Numerical Control) machinery. The light boxes were milled to accommodate the cold cathodes from 40mm square Aluminium bar and the spacer bars were machined and tapped from 16mm round Aluminium bar (special thanks to Carlos from Hispano Engineering).

These parts were hand-polished using oiled Wet & Dry then buffed with Brasso to produce the mirror finish.

Tony's Yellow

Technical details

- AMD Athlon XP 1800+ @ 2000
- ThermalTake Volcano 9 HSF
- EPoX 8KHA+ motherboard
- 768MB PC2100
- Maxtor 40GB 7,200rpm HDD
- Seagate 40GB 7,200rpm HDD
- Leadtek GeForce2 Ti
- SoundBlaster Live 5.1
- AOpen DVD-ROM
- AOpen 16x burner
- Three 80mm fans – two rear, one front
- Three 90mm fans in roof
- Two neon lights – one blue, one green
- A lot of melting

The story:

It took about two weeks to do on and off. I had to strip it back to bare metal and plastic – tip: don't use paint-stripper on plastic, because it takes an awful lot of work to get the melted plastic back to good condition. I then cut two holes for the fans on the back, one in the lower front, a 90mm in the top, and a window, of course.

Now, it took me a whole day to cut these holes because I don't have any tools – so I improvised. I got the trusty hammer and flathead screwdriver and started bashing away, then spent hours with a file cleaning up the mess I made. After that, I applied three coats of paint, then the fun bit: the flames! What a mission. I tried a few templates that didn't work very well and had to strip and start again.

While I had it out I made an etching for the window and had to melt it to the Perspex with a hair dryer, fitted a blue neon light in the bottom and a green in top to show up the etching.

$2,000 PRIZE POOL

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Sony Memory Stick PRO 1GB

SUPPLIER: **Sony** www.sony.com.au
PHONE: **1300 137 669**
PRICE: **$1,425**

By the end of this year, nearly every Sony consumer electronics product will have a Memory Stick slot.

This means you'll be able to download pictures from your CLIÉ PDA to your Minidisk player, allowing you to not view them.

Err, cool. Sort of.

It's all part of Sony's ubiquitous network plan, and we're sure there's a really good reason for it. . . we just haven't been able to figure out what it is.

Sony has somehow managed to squeeze a massive 1GB of storage capacity onto its latest Memory Stick PRO card. That's a lot of pics of Phoebe Cates.

When you consider the Memory Stick is smaller than a tasty piece of gum, it's hard not to be impressed.

Zalman multi-fan speed controller

SUPPLIER: **Altech** www.altech.com.au
PHONE: **(02) 9735 5655**
PRICE: **$80**

'Oi, you. Think you're a well 'ard case modder? So why the fruck don't you have a Rheobus in your PC? Nancy boy wannabe.' Cue the sound of glass getting smashed into someone's face.

This is what you can expect if you hang out with funda-*mental* -ist case modders and don't have a fan controller in your case. Thankfully Zalman can save your precious nose from a right proper busting, with its multi-fan speed controller.

This Rheobus has six channels, each can handle a 7W or less fan. Four channels are for three-pin fans, and have a fan speed control nob. Each LED over these knobs changes in intensity as the speed is changed, and there are also two more three-pin channels, with a toggle switch to allow you to choose between 5V and 12V speeds.

Apacer Embedded Card Reader 2.0

SUPPLIER: **BlueChip IT** www.servex.com.au
PHONE: **(02) 8745 8400**
PRICE: **$82**

The floppy disk should be dead by now. But it's not. Devices such as this card reader should be the the last swift kick to the head for these archaic devices.

This card reader fits into an existing floppy drive port on your PC case, and uses the standard USB 1.1 or USB 2.0 header found on most current motherboards.

When it's plugged in you'll be able to use the following media on your PC: Compact Flash type 1 and 2, Microdrive, SM, SD and Memory Stick. How's that for a comprehensive range of media types? Thanks to the USB 2.0 support, file transfers should be much faster on this card reader than USB 1.1 models.

Sound card extender

SUPPLIER: **AusPC Market** www.auspcmarket.com.au
PHONE: **(02) 9746 0900**
PRICE: **$39.60**

Any gamer knows the suffering we go through late at night when gaming. Cries of 'Turn that bloody computer down!' have prompted us to get on all fours and dig around in the dusty mess behind our PCs, just to plug in our headphones. Sadly, many gamers never arise from this prone position, spending the rest of their lives entangled in the lethal cables behind the PC. Of course, smug bastards with sound card I/O panels and hubs have left these days behind.

We've found a solution for those of us who don't want to upgrade: the Sound card extender – how's that for imaginative product naming? And it does the job for a nice price.

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HiTi Photo Printer 630PL/PS

SUPPLIER: **Capitol Computers** www.capitolcomputer.com.au
PHONE: **(02) 9281 8890**
PRICE: **$499**

When *Atomic* was spawned, we swore we'd never look at printers or scanners. Luckily we didn't say we wouldn't include Photo Printers, which are slightly cooler than your standard inkjet printer. This one plugs into your PC via the USB port, or you can use its CF and SM ports to upload images directly to the printer. The included software is a total cinch to use: open the image you want to use, crop it to fit the standard photo-sized paper, and hit print. Forget one hour photo shops when you can get prints in a few minutes. But at $499 you'd want to run your own porno photo lab to justify the cost.

ErgoBeads therapeutic wrist support

SUPPLIER: **IMAK Products** www.imakproducts.com
PHONE: **N/A**
PRICE: **$25**

If your wrist is limp, don't feel shame – it's a natural side effect from spending your life attached to a keyboard and mouse, and not an indication of your sexual leaning.

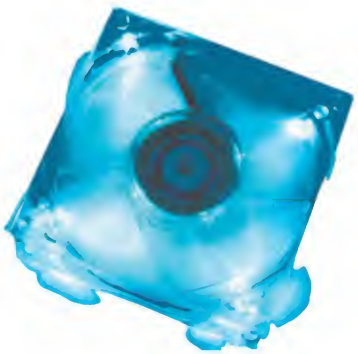
Unfortunately, using a keyboard for prolonged periods of time can result in not only limp wrists, but sore wrists, and we all know that RSI isn't funny. If you don't want to join the RSI brigade, a wrist support for your keyboard is highly recommended. This support is different from the standard supports as it's a fabric tube filled with polystyrene beads, as opposed to the rigid rubbery supports most of us are used to. You can freeze it or use it as a door snake too.

Cooler Master TLF-R82 neon LED fan

SUPPLIER: **Australia IT** www.ausit.com.au
PHONE: **(03) 9543 5855**
PRICE: **$20**

Ah, yet another LED fan. But this is Cooler Master's *new* LED fan, so it deserves a mention. The coolest feature is its patented 'Rifle' bearings, as opposed to the typical ball and sleeve bearing. This aims to provide the lifespan of ball bearings but with the silence of sleeve bearings. They appear to work, as this fan only cranks out 25dB(A) at its maximum speed, yet is still rated to last for 50,000 hours.

It also has a decent throughput of air: at 32cfm it's not bad considering how quiet it is. Of course, it wouldn't be an LED fan without LEDs, would it?



PD-A2 FLASH drive

SUPPLIER: **PC Range** www.pcrange.biz
PHONE: **(08) 8322 9544**
PRICE: **$99**

You gotta love USB flash drives. If you're running a recent OS, you can simply whack it in, copy to your heart's delight, and then chuck it into another PC. We use these heavily in our Labs – it's much easier to install drivers and apps off a USB drive than it is to configure the test machine for our network.

The cool thing about the PD-A2 is that it's a bootable device – provided of course that your motherboard supports USB drives as bootable devices. This means you can now flash your BIOS and run other bootable apps straight from your USB disk. Easy. It's also reasonably priced, and is small enough that you don't need to unplug all of your USB devices when your jack it in, unlike most USB flash disks.

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How can a fricken' blue laser make DVD more powerful? Ty Pendlebury investigates blue diode laser technology, which promises to give DVDs 120GB storage capacity.

VHS versus Beta

The media loves a format fight. Whenever two or more formats are introduced into the market, you can bet we'll be asked to swear our allegiance to one or the other almost immediately – and it will cost us. The recent DVD+R/DVD-R battle is the latest in the format war, and the reason for the clash is straightforward: with the runaway success of the DVD format, everyone wants a piece of the licensing pie.

If you thought the battle was over when the DVD Forum recognised DVD-R as the official format, you were mistaken.

DVD-RW backups are increasingly unfeasible thanks to ballooning hard drive sizes and HDTV has created the need for recordable media that can hold large volumes of data, mainly due to HDTV's relatively high bandwidth of 12-14Mb/s.

As a result, there are two major 'next-generation' technologies currently in development:

- Blu-ray – a joint effort from nine companies, including Philips and Sony; and
- AOD, Advanced Optical Disc System – proposed by DVD founder Toshiba and partner NEC.

Both systems use blue lasers and have recording capacities of 50GB or over. Blue lasers are the future of DVD recording, according to the makers, and this is due to the inherent properties of blue light.

Red laser / blue laser

Blue laser beams have a smaller 'spot' size and shorter wavelength than the traditionally-used red lasers, therefore the corresponding data pits can be much shorter and thinner, resulting in more information on a disk.

A 'blue' laser assembly mightn't be blue – it can also use indigo or violet lasers from the visible spectrum of light of red, orange, yellow, green, blue, indigo and violet. Infrared has the longest wavelength and ultraviolet has the smallest. Therefore, violet lasers would enable even smaller pit sizes again.

The advocates of Blu-ray say they want to eliminate the compatibility nightmares that have characterised the competing writeable DVD formats. But like Rocky of Bullwinkle fame used to say, 'That trick never works'. It is simply one of several burgeoning technologies competing to become the second generation of DVD, with the DVD Forum currently 'considering' the contenders.

This is a repeat of events from the mid-1990s when two standards competed for the domination of the market: Super Density from Toshiba and Panasonic, and Multimedia Compact Disc from Sony and Philips Electronics. The two rivals consulted with the movie studios, and as result a compromise format was conceived: DVD. This led, quite naturally, to the establishment of the DVD Forum, and the release of the first DVD player in March 1997. The Forum now includes over 200 companies involved in the sale and manufacture of DVDs, with Toshiba as the head.

How blue laser works

Blue diode lasers work with similar media to that used by CD for the last 20 or so years. The discs are a sandwich of injection-moulded polycarbonate plastic, Aluminium and acrylic as a combination of a singular read surface or several semi-transparent

ones in the case of DVD. The readable surface of all optical media consists of a series of bumps in a spiral from the inner to outer edge, divided into pits (the bumps) and lands (the spaces between).

In pre-recorded media, the pits are imprinted into the outer polycarbonate, which is also called the substrate. A thin layer of Aluminium is then sprayed over the top and then capped with a protective vinyl coating.

As the laser travels across the pits it is converted into pulses of light of varying intensity, which are translated into a digital signal.

Recordable CD and DVD media use a similar system, but instead of pits and lands they use a light-sensitive dye, which is sandwiched between the vinyl layer and the substrate. When this dye is heated it becomes opaque, causing the laser to reflect differently. Rewriteable media, on the other hand, uses a dye that changes states dependent upon the intensity of the laser that writes to it. This is why most CD players can read CD-Rs, while CD-RWs require newer, more sensitive pickups.

Since the CD was invented the widths and lengths of the pits has been whittled down significantly from an initial minimum pit size of 500 nanometers (nm) width x 830nm length x 125nm height (a nanometer is one x 10-9 meters – damn small!). DVDs use a slightly shorter wavelength again and reduce the size to 320nm (w) x 400nm (l) nanometers, with 740nm between each track.

Blue lasers have shrunk the minimum length per pit to 138nm, with 320nm between each track. Yet as the distance between tracks shrinks, the likelihood of crosstalk also increases, bringing its own headaches.

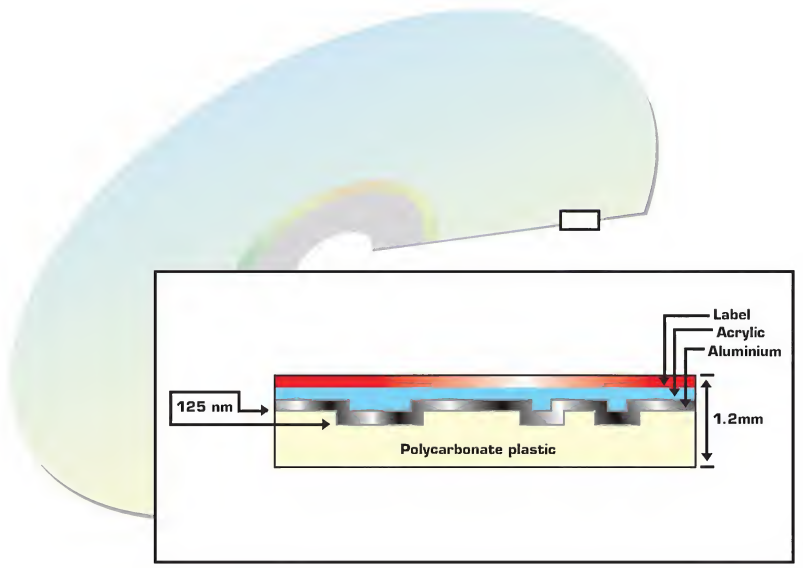
Fingerprints and scratches obviously cause problems with optical media and even more so for blue laser media. However, one of the less obvious problems affecting media is disk tilt, which can be caused by warping or an uneven spindle. This can cause distortion or even bring the disc grinding to a halt. CDs are very susceptible to it. DVDs overcame this problem by using two layers of polycarbonate instead of one, each at a thickness of 0.6mm. The steeper angle created by the shallower substrate is therefore less affected by 'wonky' media.

The final factor that determines recording density is the numerical aperture (na) of the lens: the higher the aperture, the higher its resolution. CDs use 0.5na, DVDs 0.6na and Blu-ray 0.85na.

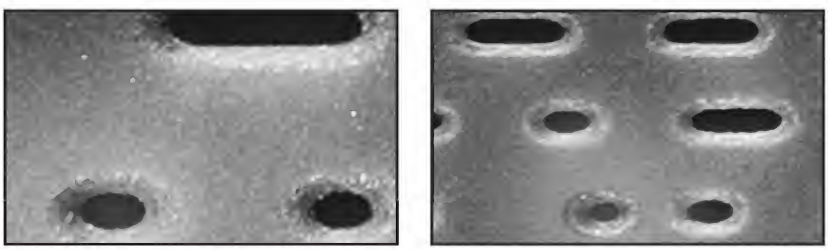
Blu-ray

Blu-ray was officially announced in February 2002 as the culmination of several companies' efforts to develop blue laser technology. Nichia Industries invented blue diode lasers in 1995 and its technology-partner Sony unveiled it to the public in 2000 under the codename 'DVR-Blue'.

Blu-ray discs will come in two formats: the rewriteable Blu-ray RE and the read-only Blu-ray ROM that comes without a cartridge. So will DVDs become obsolete in 12 months, and will you need



ABOVE: All CDs are a recordable layer (usually Aluminium) packed between two polycarbonate layers. With DVDs, there a multiple semi-transparent recording layers.



ABOVE: From the 500nm (CD), to 320nm (DVD), a simple decrease in the size of the pits has allowed for larger disc capacities.

to buy a new player? No. Blu-ray discs are unlikely to replace commercially produced DVDs, as even Sony is calling Blu-ray a recording format. . .

Unlike DVDs, Blu-ray discs use a 0.1mm-thick read layer, which, according to its makers, diminishes disc tilt aberration and allows for a better readout and increased recording density. This also means the Aluminium layer is a lot closer to the surface than in DVDs or CDs. As a result, the discs are very sensitive to dirt and grime.

Due to the shallow 0.1mm optical layer the writeable disks need to be housed in a protective shell, as any particles between the laser and the disc surface will render it almost useless.

In comparison, CDs are fairly robust as they have ten times the substrate material between the read surface and the lens.

In a response to the popular anti-piracy frenzy, Blu-ray will come with in-built copy protection – that should keep the hackers busy for a couple of weeks.

Philips has also demonstrated a format based on Blu-ray, which is smaller and intended as a flash memory-type device.

Meanwhile, UK company Plasmon has designed a professional archiving format based on Blu-ray called UDO. Plasmon anticipates that each disc will have a 120GB capacity by 2007, when third-generation disks become available. This means Blu-ray discs should also have a theoretical limit of 120GB. Joy.

As is often the case when a new technology is developed, prototype Blu-ray players are huge beasts and very costly. The first Blu-ray player released early this year in Japan cost 450,000 yen (US$3,750), with mass production of Blu-ray devices expected to begin Q3 2003. A large chunk of the price of the device is the cost of the blue laser assembly itself, at around US$1,000 a unit.

However, Sony signed a deal with Nichia in December 2002 to produce commercial quantities of blue lasers by the middle of this year. This is expected to drive the price down to around US$100 per assembly.

Will the public take to a new software format that requires a cartridge? At present, the DVD-RAM cartridge is in direct competition with the

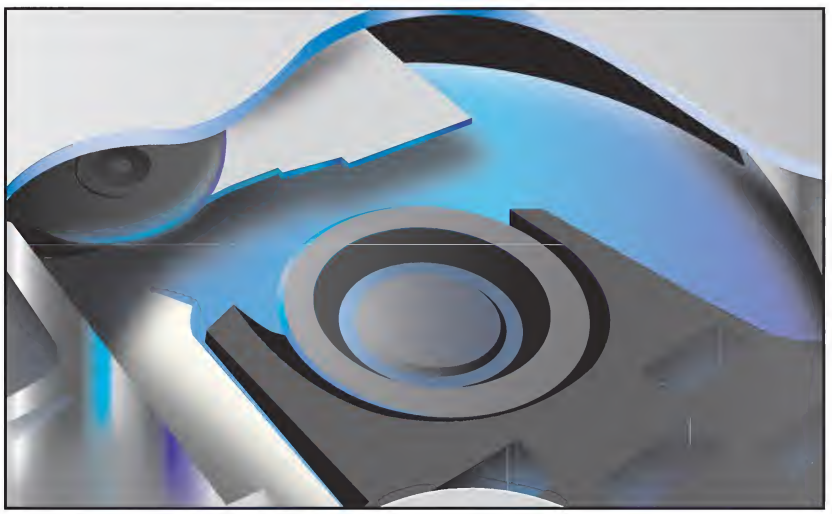
cartridge-less DVD-R/+R/-RW/+RW formats. In November, electronics giant Pioneer said 75% of all blank discs currently manufactured are DVD-Rs. This is probably a little far-fetched, and what was probably meant was that 75% of the discs produced by Pioneer are DVD-Rs. In contrast, Japanese manufacturer Panasonic is pinning all its hopes on DVD-RAM, projecting that eventually 40% of its total revenue will be from the sale of DVD-RAM recorders.

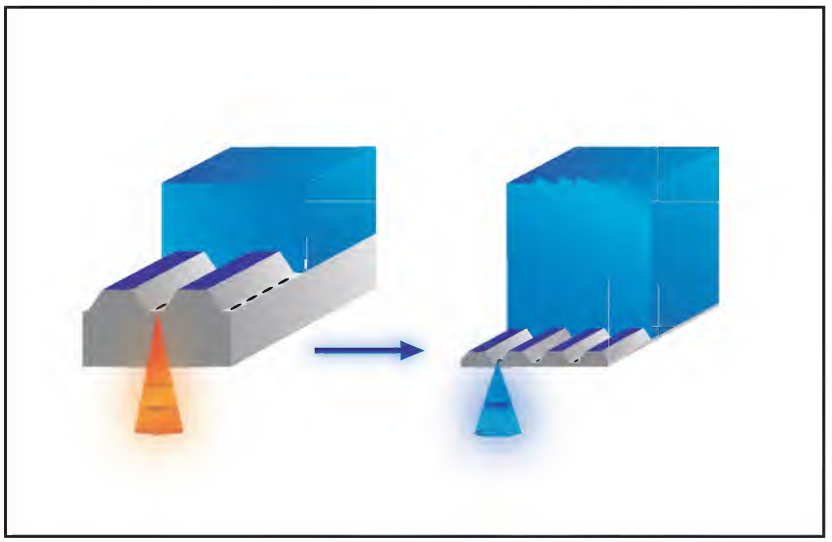
In a surprising move, Blu-ray has yet to be officially forwarded to the DVD Forum, as its makers claim it is a new generation format – without need for DVD Forum approval. This leaves Advanced Optical Disc as the only contender.

AOD

AOD is a relative newcomer to the market: it was only announced in August 2002. AOD can hold up to 20GB on one side of a disc, while prerecorded disks will hold 15GB. Similar to DVD, AOD will use a sandwich of two 0.6mm polycarbonate layers and will come in two varieties: AOD-ROM with 15GB per single side and 30GB on a double side; and AOD-RAM with 20GB and 40GB respectively. It will use the packet-writing Universal Disc Format that DVDs use, while its transfer rate is identical to Blu-ray at 36MB/s.

AOD will use MPEG-4 compression instead of the DVD and digital-TV standard MPEG-2. MPEG-4, on which the 'pirate' format DivX is based, uses a low-bandwidth compression of 1.5Mb/s, and hence is lower quality. This reduces its potential bandwidth by a thirtieth when replaying movies! Anyone who has watched a noisy DVD-to-DivX rip will probably scratch their heads at this decision – especially as HDTV with its 14Mb/s bandwidth is supposed to be very amazing.





ABOVE: Blu-ray media will have a 0.1mm thick reflective layer, compared to the more durable 1mm layer on conventional CDs. This will make them extremely vunerable to dust and grime. The solution is to stick the media in protective cartridges. So, what are the advantages? One hell of a freaking small pit size – 138nm in fact.

At the time it was announced, Toshiba and NEC were also entertaining a 0.1mm reflective layer system similar to Blu-ray. This would enable an even higher density on each disc, but this proposal has seemingly fallen through the cracks.

AOD is the only format which has so far been submitted to the DVD Forum for official recognition, and if it's given the title of HD-DVD or some such, this would help boost sales no end. because, frankly, the name AOD sucks!

Toshiba is developing AOD rewriteable drives and video recorders that are expected to be released later this year.

Other formats

Toshiba is ensuring all its eggs aren't kept in the one basket: it has developed the HD-DVD9 player, which uses a red laser. The discs would be physically identical to DVD, but, like AOD, will use MPEG-4 compression instead of MPEG-2. This allows the discs to store up to 135 minutes of high-definition video on a two-layer 8.5GB DVD-ROM disc. Indeed, other manufacturers are releasing DVDs with native support for MPEG-4 variant, DivX. This is to seemingly ween consumers on to its AOD format.

US company Constellation 3D Inc announced a disk in 2000 capable of using red laser technology to store up to 140GB of information on a disk. Fluorescent Multi-layer Discs (FMDs) were thicker than ordinary DVDs and consisted of multiple layers, which used reflected, diffused red light to generate a shorter wavelength signal. Plasmon announced in early 2001 that it would produce the discs, but Constellation has since folded, meaning Plasmon will now use Blu-ray technology instead.

Conclusion

It's still too early to say which format will emerge as DVD Mark II, as the Forum has yet to make a decision. Though Blu-ray has the hype and is first to market, AOD has the edge due to its association with Toshiba, and its similarity to DVD. The DVD Forum says it expects the standard to be decided by the end of the year.

The Sony/Philips consortium, on the other hand, seems to consider official DVD Forum recognition unimportant. In light of the DVD rewriteable fiasco, it may actually be right. But DVD is an incredibly popular format, so this is an interesting decision.

If the DVD-write controversy continues, the market may decide to pass over it completely in favour of a sturdier format with higher capacity. For us gamers, blue laser technology is a cheaper, more portable means of storage than has been available previously. Which can only be a good thing.

SONY

With the new multi-format DVD Burner, compatibility is no longer a problem.

By supporting the popular DVD formats (± R/RW) in a single drive, Sony gives you flexibility no matter what the task at hand. Turn your home movies into DVDs, make custom CDs, and save your DVD data at speeds up to 4X. Complete with its own software, it's easy to see why the DRU-500A is the perfect match for any home or office set up. Visit us at www.sony.com.au or call 1300 13 SONY (7669)

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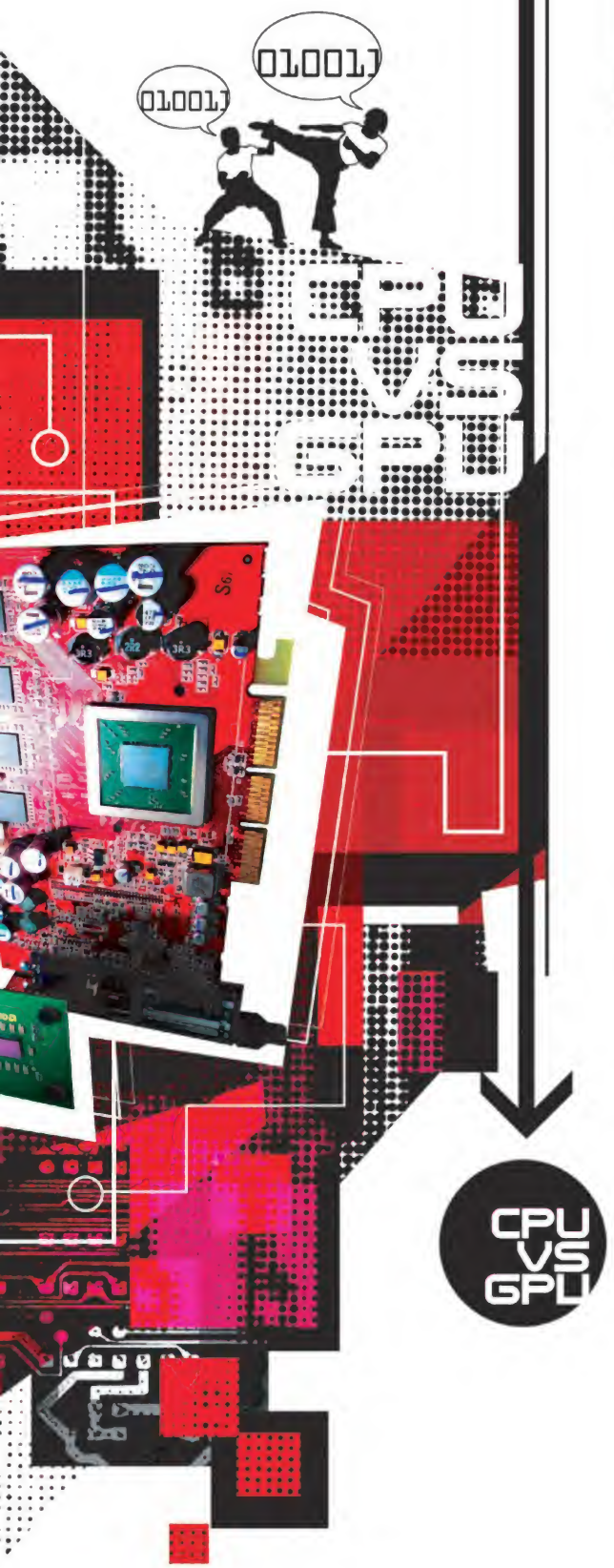
CPU VS GPU



. . .and the future of processor architecture. Fight!

We really appreciate all the work our superscalar CPUs do. Actually, we're *eternally* grateful. So when James Wang lets us in on the secret that GPUs flog themselves just as much, we were crazy with joy. Completely insane actually.

To put the CPU and GPU side-to-side and compare their internals, I/O and design philosophy is a serious undertaking. Thanks to the latest class of DirectX 9-compliant GPUs, it's also fascinating. Without the ability to branch, loop, or support floating-point data, a comparison between the CPU and GPU would make little sense. It's a fairly heavy topic, but not insurmountable. If at any time the technicalities get too chunky, just skim through. The most interesting aspects are covered later when we investigate the future of both types of processor.

A simple concept: pipelining

Here's an experiment. Try using your brain to compute two additions simultaneously. You'll find that calculating '4 + 9' and '7 + 8' at once in your head is impossible. What you would have done is add up four and nine, and remember the result 13. Then add up seven and eight and remember the result 15 – sequentially. In other words, for arithmetic, our brain is a single pipeline processor. It can sequentially compute but not two things at once.

A processor's (both CPU and GPU) pipeline has several stages. The first element (pipeline stage) may be a fetch unit that grabs instructions, followed by an arithmetic logic unit (ALU) and a final stage to write to memory. Because each stage is activated by the electrical signal from a clock cycle, one cycle will travel through and stage by stage (like our brain) turn on each element to produced the final result. The more stages in a pipeline, the more work gets done in one cycle. To put this in context, the Pentium 4 has a 20-stage pipeline. In GPUs, each stage in a pipeline has very specific roles. This makes it possible to have graphics transformed to verticis, lit, then rendered in a single swoop.

By now you can see that pipelining works because any additional calculating blocks use the same clock signal. And this makes adding more elements an obvious way to increase performance. Deeper pipelines also help scale processor speed, which is a key design feature of the Pentium 4's 20 stage pipeline.

It doesn't take a genius to take pipelining to the next level by having multiple pipes. This concept is called parallel pipelining, and is at the heart of a GPU's extreme fillrate. In CPUs, this design (having multiple, parallel arithmetic pipelines in the execution engine) is called 'superscalar' execution (Diagram 1). In other words, superscalar processors have the ability to do more than one math operation at the same time, whereas normally you'll need to wait for the next pipeline stage.

When you combine the concept of a pipeline consisting of multiple stages, and a superscalar part that fuses ALUs together in the execution stage, you get our modern day CPU.

Memory Hierarchy

One thing that doesn't differ between CPUs and GPUs is their data source – they both access the main memory. You are probably familiar with all the stages, but if you haven't had any programming experience, the word 'register' may sound a little vague. Registers are important because they store the exact size of data that CPUs can work on. If two numbers are to be added, they must be stored in separate registers before the CPU can add them. As most operations boil down to arithmetic for a handful of inputs, it is important that the CPU can access these quickly. Conceptually, think of Homer Simpson. To keep this food processing unit (FPU?) happily fed, the last stage of caching must be within 'reaching distance' of his couch. A CPU is like Homer on a lazy day: it can only work on things within grabbing distance and relies on memory controllers (Marge) to shuffle data (food) back and forth between the HDD (supermarket), memory (kitchen) and L1/L2 caches (tables).

CPUs and GPUs are really just a collection of processing elements, whose arrangement is known as CPU microarchitecture. However, this is just half the story. Today, CPUs are clocked so high that it's not just the raw clock speed that matters, but making sure the superscalar beasts are data-fed. This is why a memory hierarchy using multiple caches is employed. Even with full speed caches, the time it takes to fetch instructions from memory (latency) is still unacceptable for good performance. This is where the branch prediction comes in to play. For example, a certain AI program may use the following logic: if there is a human player in the game, execute and repeat the 'attack_human' function until the player is dead. This is a case where branch prediction can allow the CPU to execute the 'attack_human' before the condition of 'is there a player' is evaluated. Considering that most of the time you will be alive, this pre-fetching mechanism will save a good deal of latency – the same amount needed to evaluate the pretext. Due to the nature of most computing problems and the advancement of prediction algorithms, you will find that most branch prediction (>90%) is correct and hence is a vital part of CPU performance today. GPUs, having just developed the ability to process conditional branches and loops (DirectX 9), have yet to incorporate any prediction logic.

CPU vs. GPU: Input and output

Input part is a very important element, as it's the only way to reach the theoretical performance numbers offered by both processors – by making sure they are fully fed at all times.

The CPU mostly conducts short math operations. Unlike the GPU, data and instructions won't need to go through an ultra-complex process to produce stunningly abstract results. Most of the time is spent handling Windows tasks. Due to the relative simplicity of the tasks, instructions spend a very short amount of time on the CPU but will be more or less shuffled back and forth between memory. There are of course exceptions to this, such as data-centric scientific computing, and repetitive tasks such as MPEG encoding and Photoshop filters. This is where the FPU and SIMD features of the CPU kick in, which are designed to handle repetitive math operations. Due to this fast processing and heavy shuffling nature, the bandwidth and latency of the memory subsystem is *the* crucial concern of a powerful CPU. A CPU fed by the top of the range 600MHz DDR-RDRAM receives a luscious 4.8GB/s of bandwidth to main memory. By comparison, using the latest AGP 8x interconnect, a GPU has only 2.1GB/s to the memory. Even next to a modest memory configuration such as PC2700, it still pales in comparison.

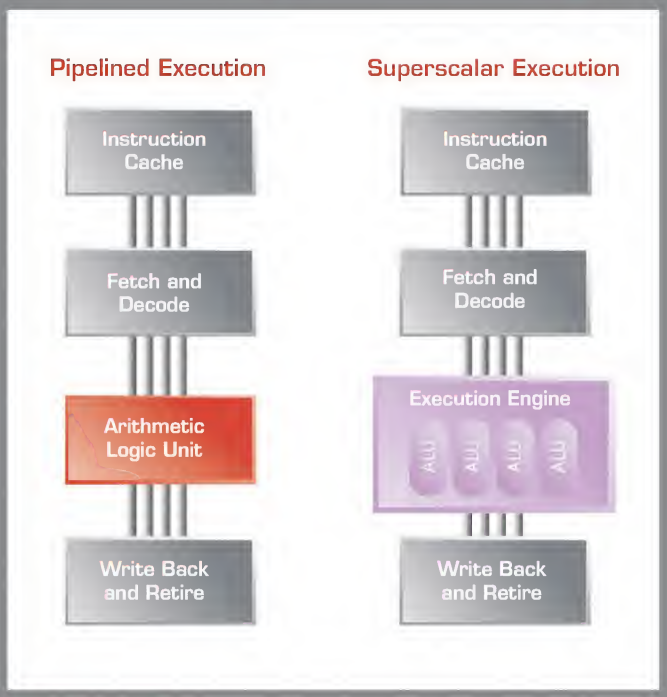
On the next level of memory is the L1/L2 cache. In this area, the CPU is set on a path that will greatly overun the GPU. This isn't to say it's better, but rather the CPU needs it more than the GPU. Modern CPUs use a large fraction of their transistors on cache. This is especially true for the bigger chips out there. This trend of more cache and less logic is set to continue, until the actual 'processing elements' are tiny blocks in a huge sea of cache. A Pentium 4 Northwood has 512KB of L2 cache and 8KB of L1. The follow-up Prescott is said to double this cache to 1MB for L2 and 16KB for L1. Cache budget is increasing due to the diminishing returns of adding more pipeline elements and the reliance on low latency storage. A GPU, on the other hand, has two main caches: a vertex cache and a pixel cache.

'The only way the CPU can beat the GPU is by becoming a GPU.' – David Kirk, Chief Scientist [in Sydney conference]

These numbers are never disclosed by ATI and NVIDIA, but are unlikely to be greater than 1MB. Future CPU caches will greatly strip their equivalent GPU due to the different design philosophy. GPUs need the extra transistor budget to do more maths and can't afford lots of cache. As David Kirk put it: 'If you took half of the Geforce FX and replaced it with eDRAM, you'd end up not having a Geforce FX anymore!' Every transistor in a GPU is dedicated to very specific 3D functions, while cache is reserved for the vital functions in helping throughput in vertex and pixel operations.

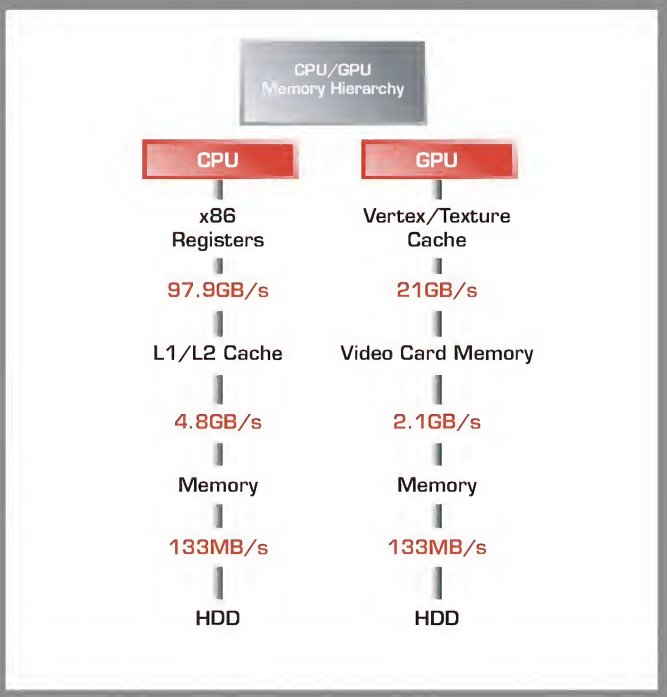
The final comparison in I/O is registers. The Pentium 4 packs a total of 32 registers, such that integer, floating-point, MMS and SSE pipelines have eight each. This is not very generous and reflects one of the weaknesses in nature of the x86 ISA (Instruction Set Architecture). DX 9 GPUS are a lot more capable in this respect, with the NV30 packing 16 input registers, 16 temp registers and a host of others. The R300 is even more capable with 32 temp registers to work with. The I/O and pipeline comparison can be summarised as follows. Due to relatively simple work done in the CPU, simple pipelines are employed, and a lot of transistors are used in caching and prediction logic. This has made the CPU strongly dependent on high bandwidth, low latency memory systems. Hence, the available memory bandwidth for CPUs greatly outstrips GPUs. At the next level, L1/L2 caches will greatly increase in the near future. Once again, this has to do with the CPU being tied to high data dependency. GPUs, in contrast, concentrate on complex operations that may take many cycles to complete. This nature means bandwidth from the system memory isn't as critical, as one chunk of data will tend to loop around the GPU a lot before the correct pixel result is achieved. This has resulted in GPU engineers spending nearly all their transistor budget on logic, leaving only tiny caches.

With the advent of full programmability, register counts in GPUs have been significantly beefed up to cope with this increased complexity.



Pipelined execution: A collection of common elements for processing is stringed together in a pipeline. One clock cycle propagates through the entire pipeline hence four operations are done in a single clock tick.

Superscalar execution: By taking pipelining to one more level, additional arithmetic units are arranged horizontally in the execution engine, allowing the processor to compute more than one scalar in a cycle, hence the term 'superscalar'.



ABOVE: At a glance, the CPU memory system tramps over the GPU in bandwidth at every level.
This however is due to the shuffling nature of CPU data and the inability to reuse data already on-chip.
A GPU's data typically needs repetitive processing on-chip before the result is sent off, hence the less reliance on bandwidth from main memory. So, it's now possible to see why things aren't as straightforward as they might seem.

Pipelines and Integer performance

A CPU consists of one long pipeline with a superscalar execution engine. This is to say that the only part that uses parallel pipelines is the part after CPU instructions have been decoded. For a typical CPU like the P4, its execution engine consists of two pipelines with two ALUs (Arithmetic Logic Units) per pipe and a separate, slower ALU resulting in three pipes and a total of five ALUs dedicated to integer (whole numbers) performance. Floating point operations (decimals) on the other hand, are done separately using dedicated, fully pipelined units. This combination makes a CPU a great general processor.

A GPU consists of multiple stages with two stages using parallel pipelines. Whereas CPUs use multiple units only in the execution stage, a typical GPU such as the R300 will have four pipes in the vertex engine, and eight in the pixel engine. The data worked on by the vertex engine will be typically 32-bit integers, the same type processed by the CPU's arithmetic units.

In the R300, each vertex unit is fully pipelined such that it can calculate a vector (with four components) and one scalar in a single clock. With four engines, the aggregate output is four vectors and four scalars, putting the R300 well into superscalar territory.

However, running at only 325MHz, it's almost ten times slower in raw clock speed compared to the latest Pentium 4, which makes the R300 a poor candidate for integer maths. Overall, GPUs are akin to a group of multiple pipelined processors inside one package.

CPU VS GPU

Floating-point comparison

Floating point maths is the heart of scientific computing, media processing and 3D graphics. However, a fair comparison in this area is almost impossible. Intel will claim to have many times the performance of the Athlon XP, in regards to optimised SSE2 instructions. NVIDIA will claim many fold performance over the Pentium 4 due to the heavily parallelised pipelines of the NV30. Sony will tell you the PS2 is a supercomputer that can guide an ICBM across the Pacific. Decimal maths allows an entire new league of marketing slew, none of which resemble the real world performance. Real world floating-point performance is dependent on the way the application is coded and optimised. With SSE/SSE2 enhanced code, the floating-point performance of the Pentium 4 is indeed tops for consumer CPUs. This is fine for non-3D use, but when it comes to games, the real workhorse is still the DX 9 GPU.

Looking toward the future

Lithography and process technology are two pillars that drive Moore's Law. This involves better interconnect materials, new Silicon technologies and finer carving tools. These fundamentals are growing by some 70 percent a year. As this technology is available to CPU and GPU engineers, it is interesting to see how each processor is leveraging this. It turns out that actual CPU performance is increasing by 140-150 percent a year, while GPU's increase by 150-175 percent a year.

The main reason for this is the nature of the work. GPUs exhibit this behaviour by exploiting a very specific data type, namely 3D graphics that are easy to work on in parallel. Had the same set of work for the CPU been handed to the GPU, performance will grind to a halt. Of course this is also true for the opposite case:

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CPUs can't hope to cope with present-day graphics. In short, GPUs have appeared to outstrip Moore's law due to their acceleration of specific data and extracting parallelism on all levels. CPUs have not, due to their more generalised nature.

Where are CPUs headed?

Current CPU design through pipelining and superscalar execution has reached their effective limits. There are two major changes you will see in years to come. The first is more cache. No longer will CPUs have KB of cache, but many megabytes. With each new die shrink they are offered more transistor budget. As traditional micro-architecture has hit the wall, adding cache is a natural and effective solution. But it would be far too simple to just incorporate more memory, as soon this will also hit its effectiveness barrier (too much of anything is bad for you). The next big thing in CPU architecture is the incorporation of multiple CPU dies on a single package. IBM and Apple have shown this to be commercially feasible with their long-running Power4 series. AMD is well into its dual-core Sledgehammer. Intel won't be too far behind.

Architecturally, CPUs will be moving past superscalar and into a more aggressive and software driven model known as VLIW. Very Long Instruction Word architecture takes parallelism into a new level by letting software pair up tasks which can be done independently and sending them to the CPU as a very long word. In effect what the CPU receives is pre-packaged goods ready for use. This removes the complex hardwired controls for branch prediction and out of order execution, traditionally employed to package data into parallelisable chunks. VLIW by its nature simplifies CPU design, hence the hardware isn't very exotic or challenging to design. Rather, the current spearheading of research is into designing compilers smart enough to look down branches and package code in this manner. With also the ability to translate legacy instruction sets on the fly, VLIW may very well end up as the next best thing in CPU micro-architecture.

For the past decade, symmetric multi-processing (SMP) has been out of the consumer's reach for reasons of cost, form factor and software support. With process technology reaching a billion transistors before 2008, integration will be brought to a whole new level. Forget two or four CPUs – how about sixteen processors on a single die with 35GB of eDRAM? This is projected to fit on a tiny 50mm^2-die using processor technology available before 2011.

GPUs in the future

In the GPU arena, things will be changing even faster. The current level of compliance on GPUs is only version 2.0 of the DirectX 9 shader specification. Version 3.0 vertex and pixel shaders will be fundamentally simple, yet impossible things will become a reality. Current vertex shaders cannot create or destroy verticis for example; they can only move existing ones. When vertex shader 3.0-hardware becomes available, true displacement mapping will be possible by using the vertex shader. Another trend that is set to continue is more pipelines. According to David Kirk, you can look forward to more than 32 pipelines in the years to come.

Although more capable graphics features will be unlocked, what is truly exciting is what the GPU has become. It has come so far from its primitive texture sampler that now it fits the computer science definition of 'Turing Complete.' In other words, it can solve any problem that the CPU can, given enough cycles. The vertex shader, for example, may sound quite rigged to do only geometry processing. In reality, it can now do a great deal of arbitrary maths. A programmer can use it like a CPU for integer and vector calculations. Then there's the pixel shader, which in the case of the NV30 has reached full 32-bit, IEEE-compliant floating bit precision. How is this significant? This data format is also used by the CPU's floating-point unit. By employing the same data format, operations can theoretically be mixed and matched between the two processors; any work that was traditionally processed by the CPU's FPU can now be done with pixel shaders – the underlying trend is a shift of maths-intensive operations from the CPU to the GPU.

The greatest obstacle to parallel computing

While we've discussed all the merits of using pipelining and superscalar architecture, one thing has been left to the end – the software. As we saw with the case of the GPU, parallelism can be exploited if the data is suitable. With the future pointing toward multi-cored CPUs and GPUs exceeding 16 pipelines, technology that can partition the workload to different processing elements will be absolutely essential. Two things specifically need radical improvements in the future: prefetch/partitioning logic and compiler technology.

For the future of SMP and horizontally-scaled systems, there need to be much cleverer and efficient ways of breaking up a big problem into smaller ones of different threads such that it can be dispatched to separate processors. This is a very difficult software problem and is practically impossible for data that has strong interdependency. This is the case whenever the previous result is needed to compute the next result; when such problems are broken up and sent to separate processors, efficiency is not enhanced as they can not be worked on independently. With the advent of multi-core CPUs, compiler and partitioning logic will need enormous improvement and programming will need to shift to a multithreaded level.

CPU and GPU will co-exist for many years to come and is unlikely to face integration in the desktop space. CPUs have come from single pipeline to superscalar and are moving toward VLIW. GPUs have evolved from hardwired texturing units to processors that boast floating-point abilities more powerful than a CPU. With process technology going full steam for at least for another decade, multi-core CPUs will become mainstream and SMP programming will require rethinking. GPUs will continue to gain greater programmability until all restrictions are removed. When this stage matures, essentially nothing is hardwired and 3D is returned to software rendering. Both technologies are driven by processor advancement and parallelism, which have well understood solutions for the next decade. Instead, the focal point for future research will be creating hardware with efficient partitioning and optimising compilers for parallel code output.

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Performance growth – what are the limits?

Dr Carlo Kopp offers a more intimate examination of the performance growth curve to show you what you're missing out on.

Over time, performance growth, and its corresponding reductions in dollars per performance, show an unbroken growth curve since the 1960s. There have been the occasional peaks and dips, but largely the Moore's Law curve has remained an unchanging feature of life in the computing game.

Moore's Law has sadly become a bit clichéd, after being quoted by all and sundry to support arguments that often have no substance. Marketers too often believe that mentioning the magic two words somehow confers credibility to the incredible.

In this month's discussion we will look a little more closely at the factors underpinning Moore's Law, and the broader issue of performance growth limits.

Most readers will have a keen appreciation of the reality that modern CPUs, GPUs and support chips are fabricated (fabbed) on wafers of very pure Silicon. The complex circuitry which makes up a modern processor or support chip is the result of repeated photolithography, etch, diffusion and polishing operations performed on the wafer. A microprocessor for instance is a very complex collection of logic circuits, each made of gates and latches – the gates and latches in turn being made up of individual transistors. A modern processor has tens or even hundreds of millions of transistors on it, interconnected cleverly enough to form the CPU, GPU or support chip of choice.

Chip performance growth limits

What are the key factors determining chip performance growth limits, and how are they related?

The first factor is the architecture of the chip itself, or the manner in which its logic circuitry is interconnected. Architecture is a complex area: it determines why for instance a Pentium 4 and Athlon XP fabricated with identical transistor performance, and similar transistor counts, perform differently on similar tasks.

Architecture can't be explained in two paragraphs – it's too complex. Today's desktop PC is architecturally most akin to a 1960s or early 1970s mainframe computer. What *can* be said in two paragraphs is that more transistors on a chip permit the design of more sophisticated architectural features, which improve performance. Pipeline depths, numbers of superscalar or VLIW execution units, superscalar logic for detecting parallelism, branch target caches, instruction and data caches are all features which are feasible with millions of transistors on a chip. The larger and more complex they can be, the more they can deliver in terms of performance growth.

Dense and denser

If a computer architect can fit a larger number of transistors on a chip, then the architecture can be more refined – the simplest analogy is the difference between a large 1960s fridge-sized minicomputer, and a three room-sized mainframe of that era. Both were built from chips of similar density, the mainframe delivering many times the performance because its architecture was more complex and able to do more things at once. The punch line is simple: the smaller the transistor size, the higher the chip density – the higher the density, the more sophisticated the architecture.

This of course brings us to the heart of the matter: the humble little transistor. A transistor is a tiny, solid-state high-speed switch in a digital circuit. Since the 1950s we have seen a great many transistor styles appear, blossom and disappear. There is little resemblance electrically or physically between the Germanium alloyed PNP bipolar transistors at the cutting edge in 1955, the epitaxial planar NPN bipolar transistors in 1980, and the Complementary Metal Oxide Semiconductor (CMOS) transistors in today's Athlon XP or Pentium 4.

The payoff for shrinking a transistor is more speed. The smaller the transistor, the less electrical charge it needs pumped into it to make it switch, and typically the faster it can be made to switch. In many modern transistors the mobility of the charge itself through the semiconductor material, be it Silicon or Gallium Arsenide, becomes a limiting factor in how fast the transistor can switch. Silicon transistors start to run out of puff at several gigahertz, and the fastest current transistors in the market are Gallium Arsenide used in radar communications.

Will Moore's Law be broken?

Much of the Moore's Law argument in science circles centres on how small, and thus how fast, transistors can be made. Many transistor designs today are approaching the limits of the technology. Quantum tunnelling effects can cause them to leak charge and not switch properly if sizes are made dramatically smaller than currently. Another speed limiting factor has been the electrical behaviour of the insulating layers on the chip. Carbon doped Silicon dioxide and polymer materials are the current fix – the traditional Silicon dioxide insulator forces transistors to pump more charge into the on-chip wiring to achieve a higher clock speed, thus wasting energy.

Size and speed have other effects. Power dissipation is one of them. Historically power dissipation has always been related to speed, and driving any transistor faster than its peers would make it run hotter. The shift during the 1990s to CMOS, then hardly the fastest transistor in the marketplace, was due to its low heat dissipation per switching cycle. Even so, today we see the nuisance of fan driven heatsinks on every larger chip. CMOS transistors are uniquely good in this respect, as most of the waste power they release is produced during the switching cycle itself – indeed in CMOS CPUs power dissipation grows mostly with clock speed. The rule of thumb is 'double the speed, double the waste heat'.

Getting rid of heat in a slab of Silicon is a perverse problem. If the thermal conductivity of the chip and package is too high, the operating temperature will rise, thus increasing the operating stress of the chip. Push it beyond some temperature and it will break down. Even below such temperatures, running hot impairs reliability. Density matters in this game. If we double the number of transistors, we double the power to be dissipated, so for a given heatsink, this doubles the difference in temperature between the chip die and outside ambient. If we clock the chip twice as fast, dissipation from transistors will roughly double.

In short: performance growth is limited by transistor and on-chip circuit speed, in turn limited by materials and transistor size, but also limited by heat dissipation and architectural design. There should be a law for it.

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Every man and his PC building dog are jumping on board the mobile PC bus to cash in on this high-growth rate sector. Wireless computing is almost as hot – according to Intel, more than 50% of laptops sold in 2003 will include Wireless adaptors. These two trends appear to be the driving force behind Intel's new Centrino platform. But what the hell is it, if it's not just a CPU or motherboard chipset?

The actual word Centrino is yet another Intel-ism like Pentium and Celeron, that has no real world meaning, but we think it actually means 'massive marketing campaign to stitch up the mobile PC/wireless market without anyone catching on'. It also happens to have the ponciest logo we've ever seen.

For a laptop to get 'Centrino' certification, it must have three Intel components. First up is the new Pentium-M CPU, which was originally known as Banias and is easily the most exciting part of the package. You'll also need to include a motherboard based around Intel's new 855GM or 855PM chipset. Finally, the laptop will need Intel's PRO/Wireless 2100 802.11b network. Once you have all three together in one box, the right to slap a Centrino sticker on it is yours.

Intel is testing many of the world's public wireless hotspots and whacking up huge Centrino posters if the hotspot is configured correctly for Centrino laptops.

The theory is that this will help make wireless more accessible to the masses, eliminating any incompatibilities between the user's machine and the access point. Isn't that just grand of Intel? Obviously it believes the rest of the market doesn't have a clue about building wireless networks and PCs that work well together. Intel also thinks this campaign will help drive the rollout of wireless networking – with Intel at the helm of course. It must be noted that manufacturers can include all three components separately, minus the fluffy Centrino logo. Let's take a look at these components in a little more detail, and continue the bitching about the whole concept of Centrino towards the end of the article.

Intel 855 motherboard chipset

Available in two flavours, the GM (with integrated graphics) and the PM (without). Think of this as a revised 845 chipset. . . except it isn't. Sure, it has the same feature set, but it's been redesigned with power saving as the foremost concern. As a result it's not quite as speedy as the i845 chipset, as some of the power saving features incur added latency, but the difference isn't massive. It also uses a power-optimised variant of the ICH4, known as the ICH4-M (aka the Southbridge), which supports six USB1.1/2.0 ports, integrated LAN, and AC'97 sound. The front side bus is identical to the original Pentium 4's, being a quad-pumped 64-bit 100MHz bus. Intel claims the integrated graphics of the i855GM are twice as fast as its Extreme Graphics chipset – unfortunately we couldn't prove or disprove this claim, as it's not just a simple matter of replacing the video card, as it would be in a desktop machine.

Intel PRO/Wireless 2100

Centrino currently only supports the 802.11b wireless protocol, thanks to this wireless network adaptor. There's nothing remarkable about it, apart from the fact that for a laptop to be Centrino certified, it *must* use Intel's own adaptor. It's obvious Intel wants to move into being a supplier of wireless networking gear in a big way, but we find it quite ridiculous that other, more experienced manufacturers of wireless gear are totally excluded from the Centrino concept. Intel is planning on integrating the wireless functionality into the MCH (aka the Northbridge) that will support both 802.11b/g. When that happens, manufacturers won't need

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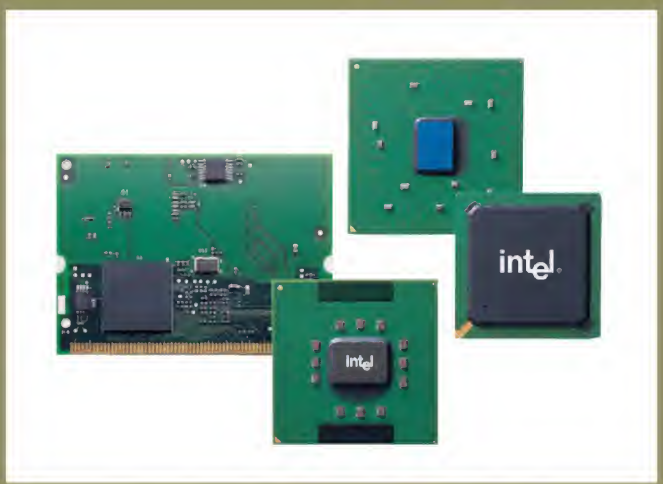
to install a separate wireless network adaptor, which is a very nice feature. However, the fact manufacturers are forced to use Intel's wireless adaptor in the meantime is something that many companies aren't going to be too pleased about. If you step on too many toes Mr Intel, you're going to get burnt as your feathers melt. Or something like that.

ABOVE: The new Centrino Hot Spot signs in action.



ABOVE: The gory details of Centrino, from left to right: Intel's PRO/Wireless 2100, the Pentium-M and the i855 chipset.

Pentium-M CPU

Finally we get to the extremely cool feature of Centrino: the fantabulous Pentium-M. Designed by the same team responsible for Intel's aborted Timnah CPU, the Pentium-M is a very interesting CPU. Here's why.

For starters, it has a massive 1MB L2 cache. That's right, an entire megabyte – until now this amount of cache has been limited to the ultra badarse processors such as the Xeon. The benefits of this are obvious: just take a look at the performance boost the Northwood P4 received when it doubled its L2 cache to 512KB. The L2 cache of a CPU is one of the most power-hungry sections of a CPU, so Intel's engineers had to figure out a way to lower its thirst for juice. They ended up using a technique that is up to four times as power efficient as a normal L2 cache, helping to keep the Pentium-M battery friendly. Like most of the power saving compromises introduced in Centrino's components, this incurred a latency hit, but the massive amount of cache balanced this out; its size also allowed the the Pentium-M to contain 77 million transistors, all on the tiny 0.13-micron manufacturing process.

Intel won't tell anyone just how long the pipeline is on the Pentium-M, other than to say that it's longer than a PIII pipeline, but shorter than the P4's. This helped to increase the frequency of the Pentium-M without turning it into the power whore that is the Pentium 4. However, a longer pipeline also leads to a greater penalty hit when branch mis-predictions occur (when the CPU guesses the wrong answer to an operation or instruction), as there is more to be flushed out of the pipeline when things go pear-shaped. So Intel developed an improved branch predictor it claims is 20% more accurate than the branch predictor on the PIII, helping to lower the occurrence of pipeline flushes.

Another revolutionary feature of the Pentium-M is known as Micro-Ops fusion.

Damn this sounds cool. This technique bundles decoded instructions together and sends them all down the pipeline at once, making more efficient use of the pipeline. This can lead to a sizeable decrease in the amount of power used by the processor. Again, it's a little slower than the standard method of sending one decoded instruction down at a time, but it's worth it if you get better battery life.

While many of these power saving steps lead to slower performance, the other techniques such as the large cache and better branch prediction make this a CPU with a higher IPC (Instructions Per Clock) than the Pentium 4. In fact, it even has a better IPC rate than the PIII – nice work Intel!

This leaves Intel in a bit of a sticky situation. While the Pentium 4 was partially designed to help push the message that frequency is king, the Pentium-M proves that, just like we've found with AMD's CPUs, IPC is very important when it comes to overall performance.

This is why the 1.6GHz Pentium-M can keep up with a 2.5GHz+ Pentium 4 in many operations. It will certainly be interesting to see how Intel manages to push the message that these medium-frequency CPUs still manage to compete with Pentium 4s clocked at a much higher frequency.

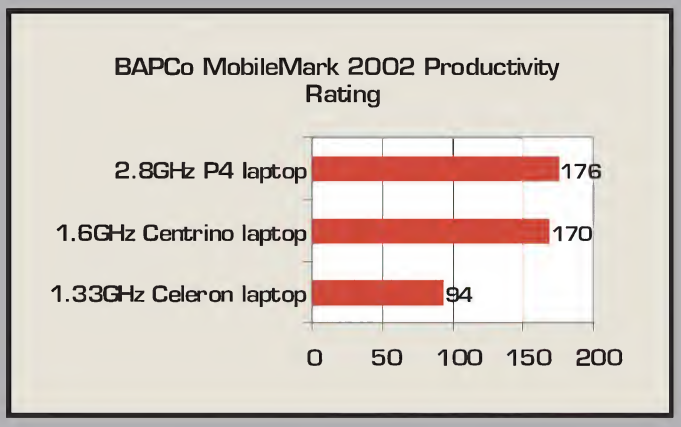
As a result of these power saving techniques the highest speed Pentium-M, at 1.6GHz, only requires a core voltage of 1.05V. The lower speed CPUs use even less, and there are also special low voltage and ultra low voltage versions of these CPUs.

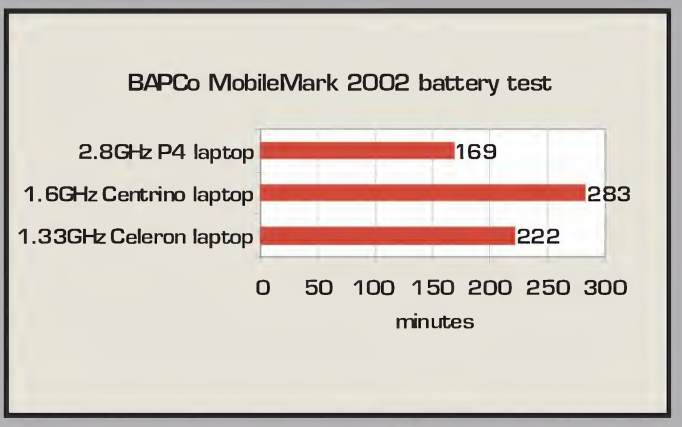
By the way, rounding out the goodness that is the Pentium-M, is the fact it's also fully SSE2 compatible. Sweet.

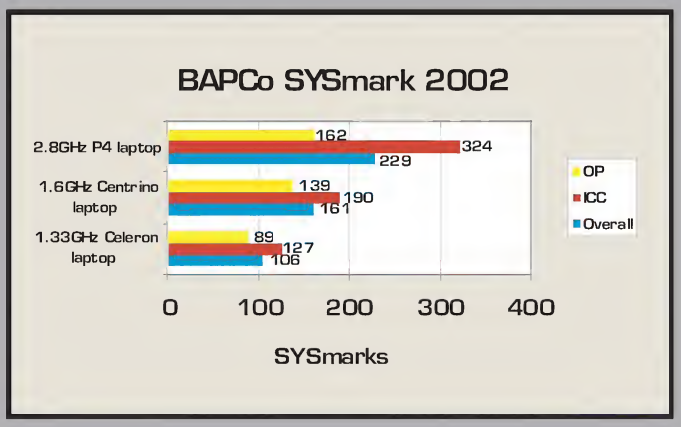
Theory is one thing. . .

As you can see, we're quite impressed by the theory behind the Pentium-M. Heck, even the i855 chipset is fairly cool – half the power usage with twice the graphics performance of Intel's Extreme Graphics chipset (in the 855GM at least). But does the theory translate into real-world performance and battery life gains? Let's head to the Labs shall we?

Notebook testing is very different to PC testing, as it's almost impossible to do an apples-to-apples comparison due to their integrated nature. So we put an Acer TravelMate 803LCi Centrino, with its 1.6GHz Pentium-M CPU, i855PM chipset, 60GB HDD, 512MB DDR-RAM, 15in TFT and 64MB MOBILITY RADEON 9000 up against a couple of other laptops. The first of these was a 2.8GHz Pentium 4 (desktop version)-based laptop, the Dell Inspiron 5100, with its 40GB HDD, 512MB DDR-RAM, 15in TFT and 32MB MOBILITY RADEON 7500. We also put it up against a 1.33GHz Celeron-based laptop, the Acer TravelMate 225X XPH BG, with its Intel 830MG chipset, 256MB PC133 SD-RAM, 14.1in TFT, and a 20GB HDD.







LEFT AND ABOVE: These results show the differing performance and battery life between a Centrino platform, a P4 system and a Celeron-based laptop. These results show that the Centrino has both excellent battery life and performance.

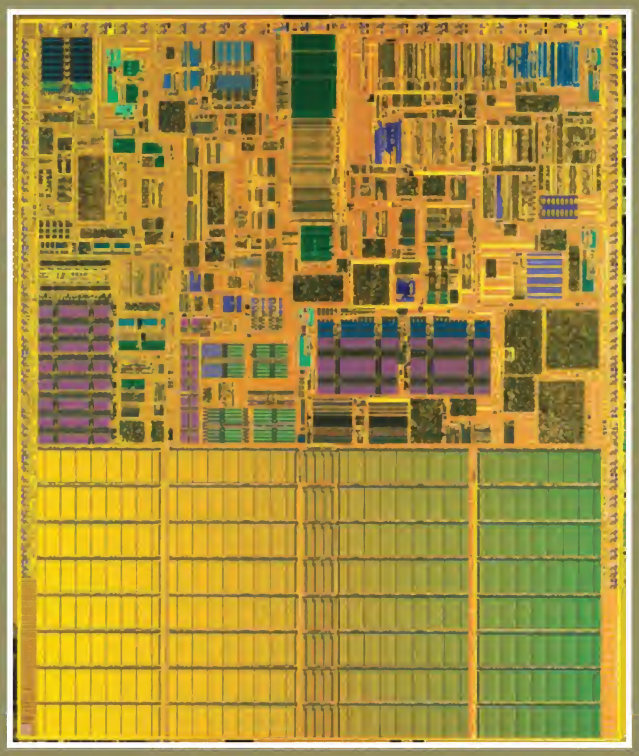
As the benchmark graphs indicate, the Centrino-based laptop is a bit of a corker. When it comes to battery life, there is simply nothing that comes close to it. We used BAPCo's MobileMark2002 battery test, and the Centrino came in at a touch under five hours, which is incredible, especially when compared to the others.

Performance was also very competitive. It was just as fast as the 2.8GHz P4 system in MobileMark's productivity test, and wiped the floor with the Celeron-based system. Its BAPCo SYSmark2002 score was also very respectable, especially in the integer-heavy office productivity tests. Unfortunately it couldn't compete with the P4 in the floating point intensive Internet Content Creation tests, but it still had a convincing lead over the Celeron based system. There was no point in comparing 3D performance of these various laptops, as the different video cards make this a moot point.

We're impressed by Intel's Pentium-M CPU and i855 chipset. What we're not too stoked about is the whole Centrino marketing push. It's simply not fair to other manufacturers, especially those involved in wireless networking. By now you've probably seen the Centrino advertisements a couple of hundred times on television thanks to Intel's enormous marketing budget, so less savvy buyers are going to think they need to get a Centrino laptop to enjoy the upcoming wireless/mobile PC revolution. But the fact is they don't, and they'll probably end up paying more for the Centrino machine when there are others that do the job just as well at a lower cost.

Thankfully, we have a feeling it won't be long before competitors' laptops start appearing on shelves with '100% Centrino-compatible' stickers on them, and hopefully this will stop Intel from taking over the wireless market.

You can be sure that when this happens, Intel's lawyers will be very busy bees.



ABOVE: A die shot of the Pentium-M, artificially coloured to highlight different components of the CPU. The lower half, looking like a large rectangular slab, is the whopping 1MB of L2 cache. As you can see, this accounts for almost half of the Pentium-M's transistor count.

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Metalbox Co Cobalt

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> Creative Audigy 5.1 Sound
> **4X USB and 1X IEEE1394 Firewire Port**
> Fast 10/100 Ethernet Network
> **Pioneer DCR111 DVD/CDRW Combo Drive**
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Metalbook Mg Magnesium

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> **Microsoft® Windows® XP Professional**

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Metalbook [Mg] together with Pinnacles Studio DV version 8 makes editing digital movies easier than ever. Metalbox [Mg] allows you to drag-and-drop your captured video footage onto the editing timeline and assemble a movie in mere minutes. Then add professional 3D scene transitions, some background music, a couple of title effects, and get ready to show the world your finished masterpiece.

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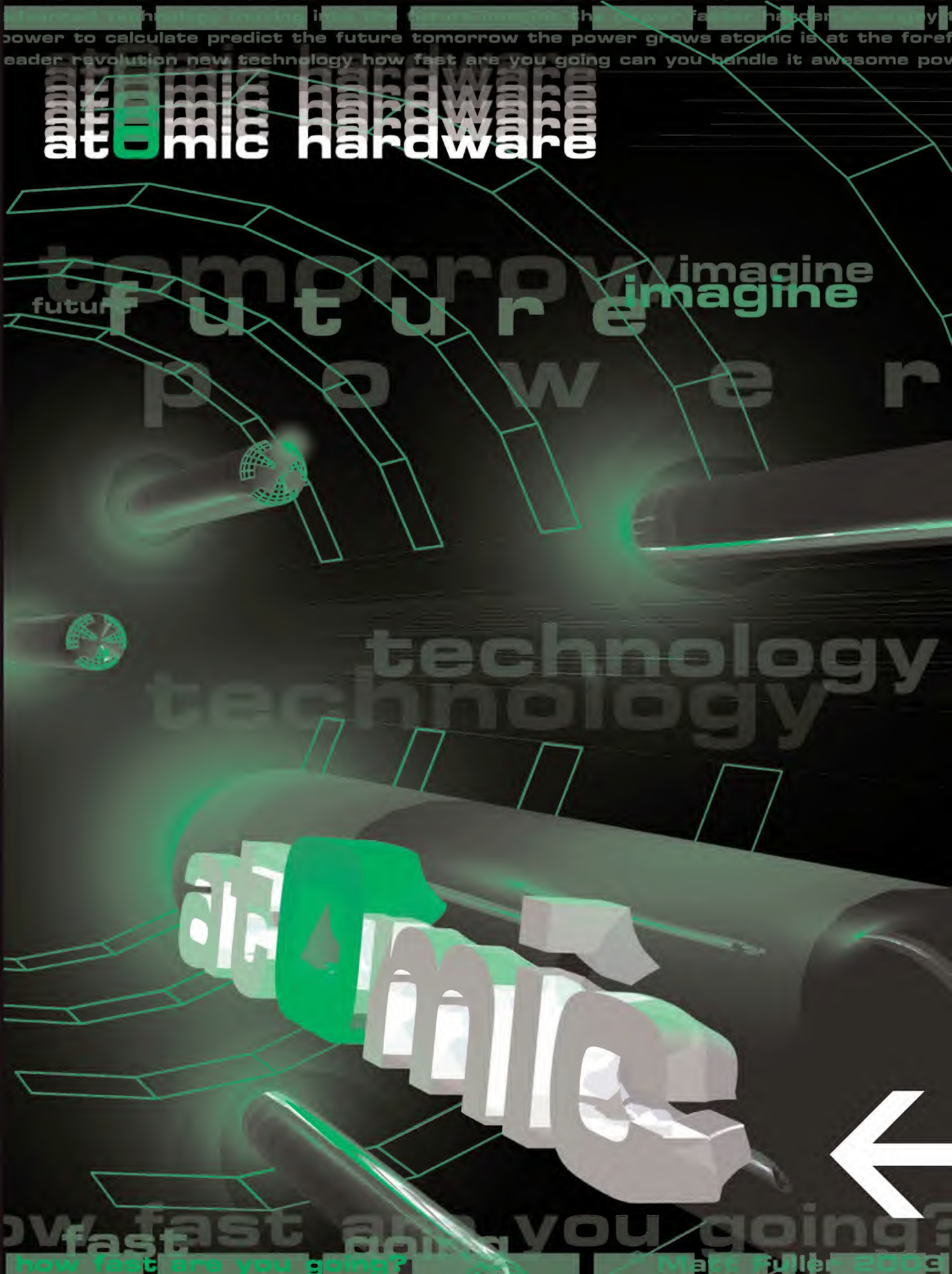
Microsoft Office XP:

Word 2002	Publisher 2002
Excel 2002	Outlook 2002
Powerpoint 2002	Access 2002

www.microsoft.com/office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Matt Fuller 2003

Phoney gaming experience

600,000 Britons dropped their mobile phones in the toilet during 2001. John Gillooly wonders if the advent of mobile 3D will end the madness.

Only a few years ago notebook computers delivered the same level of performance as a 37-year-old Czechoslovakian taxi running on watered down ethanol. This changed almost overnight, thanks largely to the combination of the Pentium 4-M and a quantum leap in video hardware. Now a big chunk of the notebook market is taken up with machines dubbed desktop replacements that run rings around all but the top-end desktop systems.

The writing was on the wall when NVIDIA released the lacklustre GeForce2 Go mobile chipset, but it was not until the second generation GeForce4 Go and ATI's RADEON MOBILITY 9000 that this paradigm shift happened with lightning speed, smashing the public perception of what a market segment was capable of.

A similar shift is impending in the mobile phone market. We have already seen functionality increase at an amazing speed in this realm, and the hardware is soon to catch up and help turn mobile phones into a lot more than just glorified walkie-talkies with crappy rings.

One of the main drivers for these changes is the current duopoly in the PC video chipset market. The intense competition and relentless pace of development has left many companies floundering as the big two push their chips to the 0.13-micron mark, with three-figure transistor counts and floating point units that can easily outperform today's CPUs.

It is unsurprising to see the two names driving mobile graphics technology are ones which are only occasional figures on the PC 3D landscape. First we have PowerVR, whose KYRO technology for the PC has died a rapid death with the growing requirement for hardware transform and lighting functions and the release of feature rich budget cards by ATI and NVIDIA.

Last year it announced a new product line, the Power VR MBX. This is a low power tile-based rendering solution, with miserly Silicon real estate (only 6mm² worth of silicon needed for the sucker) and relatively high 3D performance. ARM, Intel and Hitachi have licensed this technology for pairing with next generation hardware due sometime around 2004.

Sounding remarkably like a steam train, and muttering 'I think I can, I think I can', is everyone's favourite company, Bitboys, with its Mobile Graphics core. After years of being in the 3D hardware development game without ever actually releasing a product, mobile graphics seem the last refuge for Bitboys XBA technology.

While it has announced the technology already, it hasn't announced who it is developing for. Rumours strongly point to a Japanese mobile phone company, but geographical proximity and a couple of photos on the Bitboys Website point to Finnish giant Nokia. So far the details about this chip are highly secretive, a deliberate Bitboys tactic that stemmed from a legacy of hyping products for the PC that never saw the light of day.

There are other chips in development, with some phone manufacturers funding development in house and others looking to new start-ups for the appropriate hardware. But with the manufacturer push towards 3D on mobile phones you can be sure that NVIDIA and ATI each have one eye firmly on the market, ready to pounce when they see enough demand.

PowerVR and Bitboys have the advantage over other manufacturers because their technology is already designed for bandwidth minimisation, essential for systems that use small amounts of unified memory. The luxury of strapping megabytes' worth of dedicated video RAM is not available to phone designers, so innovative solutions like PowerVR's tile-based rendering or Bitboys use of embedded DRAM are perfect for mobile phones.

Rather than repeat the debacle of custom APIs that marred the early days of PC 3D graphics, a loose consortium called the Khronos group (www.khronos.org) has been formed to work on a new API standard dubbed OpenGL ES (Embedded Systems). Most of the big names in the industry are on the member list.

In the end, if the demand does not exist then these companies could be stuck in the same position they found themselves ending up in the PC market: high and dry with technology that is innovative, but a generation or three behind the market leaders. When we recently sat down and talked with NVIDIA's Chief Scientist, Dr. David Kirk, he drew the analogy between the home theatre PC concept, and the gap of years between the idea first emerging and the very recent release of Microsoft's Windows XP Media Centre Edition that has made it a mainstream reality.

An interesting footnote is that the only gaming-focused phone announced so far, Nokia's N-Gage, uses software 3D acceleration. When N-Gage launches later this year, it will be the litmus test for whether the public really gives a shit if they can engage in some first person shooter action on a mobile phone.

artomic

How fast are you going? By Matt 'Helios' Fuller **The image was created in Lightwave 3D 7.0 and Photoshop 7, and took me about four days of work (around school) to complete, not counting scrapped attempts or procrastination. The final render of the 3D part took around seven hours, and the text and other effects were added later in Photoshop. The intended effect was originally supposed to be a nice shiny tunnel, but the switch to wireframe came a bit later, for clarity's sake and a better overall look. Insiprations for the image were Vanilla Coke, sleep deprivation and of course *Atomic*.**

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Atomic Benchmarks

At *Atomic*, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark2002 is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, which combine to produce a final performance rating.

Unreal Tournament 2003

UT2K3 is the latest and greatest first person shooter from Epic. The game makes use of the new Unreal Warfare engine, and as such is a perfect benchmark for system performance. We use HardOCP's (www.hardocp.com) benchmarking utility to run a series of flyby benchmarks at varying resolutions to test performance. The utility also features support for a low resolution/high geometry CPU test. Results are in average frames per second.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for making comparisons between video chipsets.

HSF testing – Chernobyl

To test heatsink fans we use our custom engineered CPU replicator, known as Chernobyl. This beastie pumps a variable wattage through a solid copper CPU die replica, with a temperature probe mounted exactly in the centre of the die replica. Chernobyl results are not directly comparable with real world temperatures, but do provide a very accurate benchmark.

Quake 3: Arena *AtomicMPC* demo

Quake 3: Arena (Q3A), from id Software, is a very popular first person shooter, and represents widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, so we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance, or a particular facet of 3D, such as T&L. We can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark to perform these tests. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks.

Atomic Hot Award

The *Atomic* HOT award is given only to the most kickarse products to hit the labs, ones that score 9 or greater. They're the ones we'd want, or simply the ones we want to make love to.

Atomic testbench specs

Both test systems use Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- **AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA:** www.cassa.com.au**)**
- **Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT:** www.abit.com.tw**)**

Common components

- **Samsung 256MB PC2700 DDR-RAM (supplied by CASSA)**
- **Samsung 256MB PC800 RDRAM (supplied by CASSA)**
- **Hercules Prophet II GTS 32MB (supplied by Guillemot:** http://au.hercules.com**)**
- **64MB Apacer memory keys (supplied by Anyware:** www.anyware.com.au**)**
- **Hercules Prophet II GTS 32MB (Supplied by Guillemot:** www.hercules.com**)**
- **Sound Blaster Live! Player (Supplied by Creative Labs Australia:** www.creaf.com**)**
- **ASUS 52X CD-ROM (supplied by CASSA)**
- **Belkin PCI FireWire card (supplied by Belkin:** www.belkin.com.au**)**
- **Belkin PCI USB 2.0 card (supplied by Belkin)**

Benchmark settings

3DMark2001SE Pro

- **1,024x768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.**
- **1,024x768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.**
- **1,600x1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.**
- **1,600x1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.**

Quake 3: Arena *AtomicMPC* Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- **CPU testing: 320x240; maximum geometry detail; minimum graphics settings; high sound quality.**
- **Graphics cards: Low quality – 1,024x768; normal quality graphics settings; sound disabled.**
- **Medium – 1,280x1,024; maximum graphics settings; with all game sound disabled.**
- **High – 1,600x1,200; maximum graphics settings; with all game sound disabled.**

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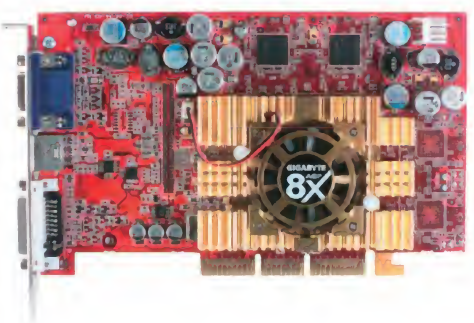
Framerate

Somehow, those wacky engineers in those wacky engineering labs continue to engineer speedier versions of the Ti4200. Meanwhile, AMD keeps level with the Pentium 4 and is developing a double-pumped 200MHz FSB. What a wonderful world.

Sapphire RADEON 9100

SPECIFICATIONS: ATI RADEON 9100; AGP 8x; TV-out; 128MB DDR-RAM
CORE SPEED: 250MHz MEMORY SPEED: 500MHz PRICE: $199
WEBSITE: Sapphire www.sapphiretech.com
SUPPLIER: Achieva www.achieva.com.au

You probably know more about this card than you think. RADEON 9100 is the new name being used for the RADEON 8500 core, a change that was made because it outperforms the RADEON 9000.
Model number confusion aside, this is an amazing performer for the price, and well worth looking at.



Gigabyte Maya II R9500

SPECIFICATIONS: ATI RADEON 9500; AGP 8x; TV-out; 64MB DDR-RAM.
CORE SPEED: 275MHz MEMORY SPEED: 540MHz PRICE: $409
WEBSITE: Gigabyte www.gigabyte.com.tw
SUPPLIER: Synnex www.synnex.com.au

The RADEON 9500 is soon to be superseded by the new generation RADEON 9600-series of cards, but for now it is the cheapest of ATI's DirectX 9 cards.
If you are lucky you may even be able to use software hacks to get this sucker running much quicker, but there are no guarantees it will work, so if you really need the speed, go for the PRO.

Compro Paladyne Ti4800SE

SPECIFICATIONS: NVIDIA GeForce4 Ti4800SE GPU; AGP 8x; 128MB DDR-RAM; TV-out.
CORE SPEED: 300MHz MEMORY SPEED: 550MHz PRICE: $399
WEBSITE: Compro www.comprousa.com
SUPPLIER: AMI Computer Services www.ami-computers.com

The Ti4800SE is the name given to NVIDIA's updated AGP 8x version of the Ti4400, which will soon be superseded by the mid-range GeForce FX cards that NVIDIA announced recently at CeBIT.
It still delivers respectable performance, edging out the incredibly popular GeForce4 Ti4200 in the speed stakes.

ASUS V9280S/TVD

SPECIFICATIONS: NVIDIA GeForce4 Ti4200; AGP 8x; 128MB DDR-RAM; TV-out; video-in.
CORE SPEED: 275MHz MEMORY SPEED: 600MHz PRICE: $419
WEBSITE: ASUS www.asus.com.tw
SUPPLIER: Achieva www.achieva.com.au

The tradition of tweaking GeForce4 Ti4200 cards well beyond NVIDIA's specifications continues with ASUS' V9280S/TVD card. Dubbed 'superfast', the card distinguishes itself by using memory running at 600MHz and a core at 575MHz.
With performance like this, the Ti4200 looks set to remain a popular card, especially with performance enthusiasts.

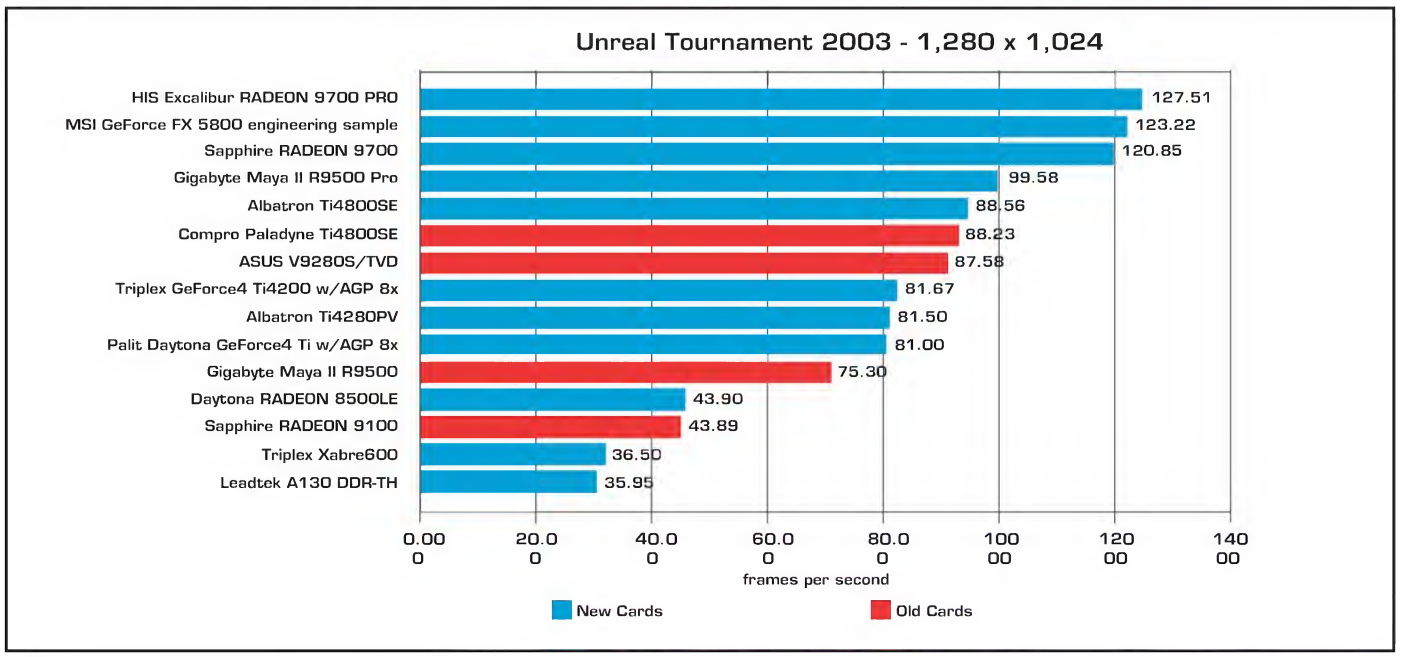
Video cards

The recent CeBIT trade show and Game Developers Conference were the sites of announcements by both NVIDIA and ATI about their new product ranges.

As expected, ATI announced cards based upon its R350, RV350 and RV280 cores, named RADEON 9800, RADEON 9600 and RADEON 9200 respectively. These cards are not huge technological leaps from their predecessors, but they do incorporate some new features as well as higher clock speeds. Cards based on these cores should start appearing relatively soon, probably around the same time that we see NVIDIA's new range.

Even though GeForce FX 5800 Ultra cards are still scarce on the ground, NVIDIA has gone ahead and announced the rest of its range, pushing the philosophy of top-to-bottom DirectX 9 support and hopefully putting to rest the DirectX 7 debacle that was the GeForce4 MX.

These new cards, the GeForce FX 5600 and GeForce FX 5200, are cut down variants of the NV30 core, and should be easier to produce and much cooler than their monstrous 5800 Ultra brother. They might even be able to run *without* a hair dryer attached.



CPUs

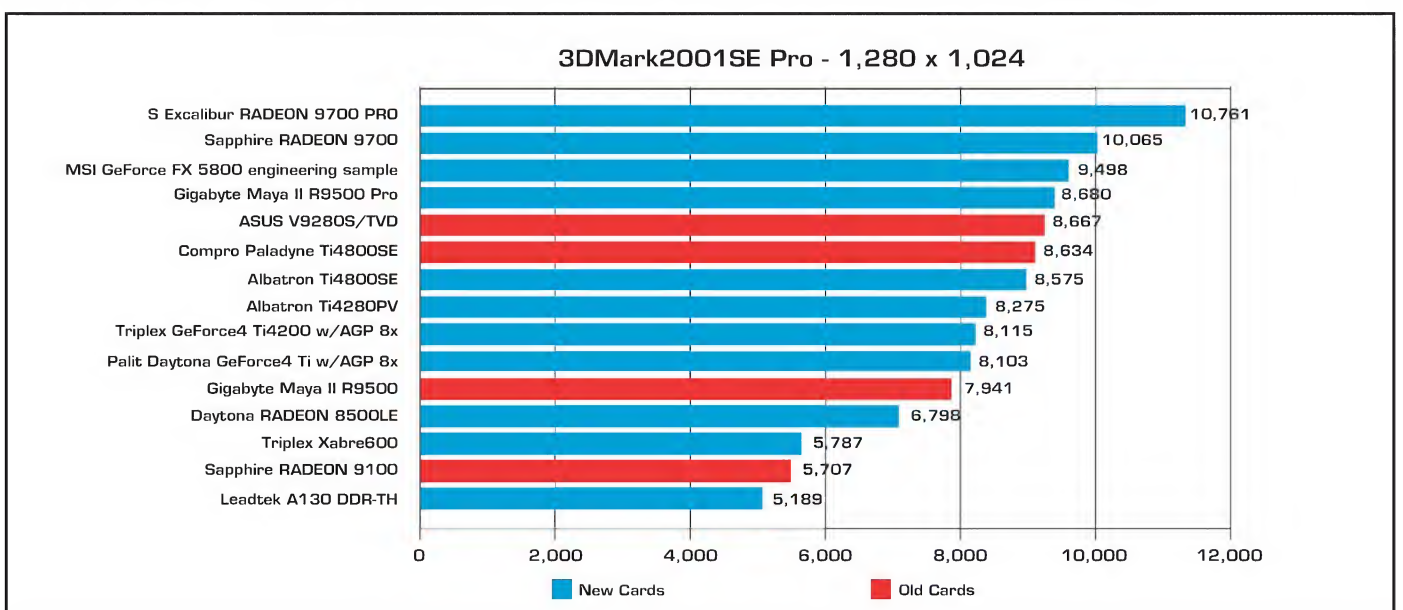
Just when we thought the relentless pace of CPU design tweaks was going to slow for a few months, we are now expecting both Intel and AMD to release tricked-up models of their CPUs real soon now.

Intel is due to launch an 800MHz FSB variant of the Pentium 4, alongside two new DDR400-supporting chipsets codenamed Springdale and Canterwood.

These chipsets bring to the mainstream the dual-channel DDR technology first seen in the workstation-level e7205 chipset and should give the Pentium 4 yet another shot in the arm as the Athlon XP begins to nip at its heels.

AMD seems more and more likely to introduce a 200MHz (400MHz effective) FSB version of the Barton core sometime soon.

It will be incredibly interesting to see how this works with existing chipsets, as it appears to be a quite recent decision by AMD. From what we can gather, the nForce2 will happily support this change, but VIA's new KT400A may not, requiring yet another minor update to its Athlon chipset line-up. Still, 400MHz is 400MHz, and the Athlon will need the boost to keep it near the Pentium 4.



ARCHOS Multimedia Jukebox

Take a tiny plastic case and a quivering mound of multimedia features, mash them together with the palms of your hands (with help from a *Star Trek* engineer), and you'll end up with a nifty ARCHOS Multimedia Jukebox.

The 'Jukebox' in the product title is not quite accurate. This contraption lets you listen to MP3s, record video and sound, view JPEGs, and watch movies via its small LCD screen. Packed along with the Jukebox is a set of headphones, a USB 1.1 cable (USB 2.0 and FireWire can be purchased separately); video/audio-out cables; Ulead's PhotoImpact and MusicMatch's Jukebox software; and a power adaptor.

Noticeable is the size of the LCD screen compared to the buttons. The controls don't make efficient use of the space, and the size of each button will give you stiff digits.

It's blocky and relatively heavy, making it hard to hold, and while the display is sufficient for the function menus, it's just not good enough for watching video for extended periods. It's quite solid in construction though, and shrugged off our attempts to make frames and sound jump during playback.

Storage is handled by a 20GB HDD. It's plenty of space, and XP recognised it fine after a reboot. While it can store and play any sort of MP3, the MPEG4 files *must* be compressed using the DivX codec at the minute resolution of 352 x 288 (CIF).

Video-out is at a resolution of 352 x 288, which is comparable to Video CD as long as the bit rate during compression is set to a decent level.

The Jukebox can also record MPEG4 video and MP3s. To record movies though, you'll need the camera module, which will set you back an extra $240.

Sound was fine with the supplied headphones; however movies were sweeter to the ear than MP3s, which 'hissed' at higher bit rates. There are plenty of options to tweak in this regard though, including treble and bass controls.

The Multimedia Jukebox is a nifty idea, but one compromised by its chunky design and interface.

Specifications:

DivX MPEG4 and MP3 recorder and player; supports MP3s to 320Kb/s, video at 352 x 288 @ 30fps; 290g.

Website: ARCHOS www.archos.com
Supplier: iTech International
Phone: iTech International (02) 9261 8101
Price: $1,045

7.5/10

DELTRON Cinema Disk

Portable devices are everywhere, and it's about time we saw some mobile movie players on the market – like the Cinema Disk. It's similar to the Multimedia Jukebox above: it has 20GB hard drive (up to 80GB); plays MP3s and MPEG1/2 video; lets you view JPEGs; and has TV/audio-out connections.

Packaged with a Li-Ion battery, remote control, carry bag and assorted cables, the Cinema Disk is a logistical nightmare. The carry bag is little more than a sleeve, and will only hold the main unit. While this is fine for listening to MP3s on the train, it's not so great for a hike to a friend's house. The battery is also a problem: when attached it looks like a box-ish turtle, and it increases the device's profile by some 50 percent.

The controls are visually appealing, and a nicely-sized LCD display takes up a third of the available space. Unfortunately, like the Jukebox above, the buttons could easily have been bigger.

Sound and video quality was great: MP3s and movies played with no jumping, skipping or decoding errors. For use as an MP3 player though, make sure you buy a set of headphones, as there are none with the Cinema Disk.

Watching movies and using the remote was reasonably comfortable. Although the Cinema Disk didn't always pick up remote commands (due to the limited sight arc of the IR eye), it was for the most part compliant with our demands. On a full battery the player lasted just short of two hours, so you'll need to carry around the AC adaptor.

The little blue light of the IR unit is also very bright, and as you need it pointing towards you for the remote to work, it can get annoying.

On the side of the unit is a CompactFlash reader, which you can access along with the hard drive when the Cinema Disk is plugged into a USB port. Windows XP flew through the detection process, and within a minute, we were able to download and upload content to the device.

If you want a movie player, choose the Jukebox; for MP3s, there are less obtrusive devices, such as Apple's iPod.

Specifications:

MP3, JPEG and MPEG1/2 player; remote; Li-Ion battery; TV-out; 20GB+ HDD; CF reader; 420g.

Website: DELTRON www.deltrontech.com
Supplier: CoNeXuS www.conexus.com.au
Phone: CoNeXuS (02) 9975 2799
Price: $1,099

7/10

Albatron

How could it be possible?

The Albatron PX865PE Pro II not just any ordinary Intel® Springdale mainboard!

PX865PE Pro II

- Socket 478 with FSB 800/1000(Overclock) MHz
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- Supports AGP8X Graphic Accelerator
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- Supports ATA133/RAID 0,1 ATA133/Serial ATA/ RAID 0 Serial ATA
- 8*USB2.0/5*PCI/IEEE1394/8chAudio (by Hardware)/SPDIF In-Out
- BIOS Mirror(BIOS Update)/Voice Genie(Audio Diagnostics)
- Supports Hyper-Threading Technology

Spec.	Other Mainboard	Albatron PX865PE Pro II
FSB	800MHz	1000+MHz*
Dual DDR	400MHz	400+MHz*
Audio	6 channel	8 channel
ATA133	No	X2
RAID 0,1 ATA133	No	Yes
RAID 0 Serial ATA	No	Yes

atomic HOT

Ti4200 Turbo
"Hot Award"
Atomic
Dec.2002, Australia

KX400-8XV Pro VIA KT400/ 8235 chipset

- Supports Socket 462 (Socket A) with FSB 200/266/333 MHz
- Supports AMD® Athlon XPTM, Athlon™, Duron™ processors
- 3 DDR 200/266/333/400 memory Sockets
- 6 USB 2.0/1.1(4 Ports by Cable)
- Onboard 3COM 10/100 LAN
- Watch Dog Timer
- Build-In 6 Channel Audio
- Supports AMD® Athlon XP™ processor Auto Over-Temperature Protection

AMD Athlon XP

AMD Barton Ready!

FX5800

- nVIDIA NV30 GPU(Core clock 400MHz)
- 128MB DDRII SDRAM(clock 800MHz)
- Dual 400MHz integrated RAMDACs
- AGP 8X provides 2.1GB/s transfer rates
- Display resolution: 2048x1536x32bpp at 85Hz
- Provides open-sourced compilers for Cg (a high-level shading language)that fully supports the latest OpenGL and DirectX.
- Built-in VGA, DVI-I, S-Video or VIVO ports
- Intellisample Technology

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Dove Electronics Ltd
Christchurch, New Zealand
TEL:+64-3-338-4722
FAX:+64-3-338-5564
www.dove.co.nz

Albatron
www.albatron.com.tw

Soar to Success

VIA EPIA-M9000

John Gillooly gains a new appreciation for the tiny things in life.

While we experience the rise of the small form factor PC, it is often forgotten that the mini-ITX form factor has been around for a little while now.

One of the big drivers of this technology has been chipset manufacturer VIA, who has pushed Mini-ITX through its Eden platform and EPIA-M line of products.

Rather than just build tiny motherboards, VIA has leveraged its purchase of CPU manufacturer Cyrix and partnership with graphics maker S3 to build an integrated solution aimed mainly at the growing market for DIY home theatre PCs with the new EPIA M-9000. While we can all put together a system that can easily cope with the specific demands of MP3 and DVD playing, VIA has created a tailor made solution that is cool, quiet, small and above all cheap.

The EPIA-M9000 is built around the CLE266 chipset, a Socket 370 chipset that supports DDR266. It uses the S3 Castlerock integrated graphics core, that will deliver 3D performance at about the level of a TNT2, but 3D performance has bugger all relevance to the board. What is more important, and exciting, is support for hardware MPEG2 decoding. It also supports TV-Out using an onboard S-Video jack.

Six-channel audio also gets an outing, thanks to a VIA VT1616 chip that can output analog 5.1 audio or digital audio via an onboard SP/DIF connector. VIA has been producing some high quality AC'97 audio lately and this is a welcome addition to the EPIA-M9000.

If the plethora of onboard features is not enough for you, then there is one PCI slot that you can use for add-on cards. Perhaps the only pressing use for this is if you want to add a wireless card of some flavour to stop that unsightly blue cable snaking through the house to a server or broadband router.

But the key to keeping the system quiet, cool and cheap is the inclusion of an embedded 933MHz C3 E-series processor, a product often derided by enthusiasts for relatively low performance, but perfect for the Home Theatre PC focus of the EPIA-M9000. There is a trade-off between this and other Eden platform boards, which use low temperature Eden ESP processors, in that it needs a fan for cooling. This fan is the only source of noise on the board, but even at the relatively high speed of 6500rpm, it easily blends into the background noise of the lounge room in which EPIA-M9000 based systems will eventually reside.

All of this combines into a board that satisfies all our needs for home theatre PCs at a fraction of the cost of mini-barebones systems. There are growing numbers of mini-ITX cases on the market, but the true potential of the EPIA-M9000 lies in the realm of the case mod.

Given that the board is so tiny, measuring only 17cm x 17cm, it can happily be shoehorned into a whole range of weird and wonderful housing.

In the past these mini-ITX boards have ended up inside old hi-fi cases, dead consoles of years past, remote controlled cars and all sorts of other miniscule containers.

As long as you can fit the board, which has a height of only four centimetres with adequate airflow then you can use whatever weird and crazy housings your mind can come up with.

Rather than subject the EPIA-M9000 to a barrage of benchmarks irrelevant to the tasks that it will end up being used for, we bit the bullet and subjected ourselves to the interminable task of listening to really loud music and watching DVDs.

One thing to note is that the board itself does not ship with DVD software, and bundled versions that come with DVD drives are usually cutdown versions with reduced functionality (hardware decoding and 5.1 audio seem to be the most commonly cut features). So Windows users will just need to bite the bullet and spend money on a full version of one of the various DVD software packages out there.

DVD playback was smooth and slick, and judging by the howled complaints coming from those trying to work near the Labs; the audio remained crisp and clear even at the highest of volumes. Because the board is targeted at home theatre, we also looked closely at the TV-Out performance and ease-of-use. Like most TV-Out video cards you will need to do initial setup using a monitor and then switch on the function in the driver. Once this change has been made, the system will happily boot straight to the device hanging on the end of the S-Video cable.

VIA has done an astounding job with the EPIA-M9000. Not only has it packed all the functions that you need onto a tiny little motherboard, it has done so without tagging on an exorbitant price tag. Sure, gaming will be limited to bouts of MAMEing, but who wants to play PC games on the TV anyway?

For DVD, music or any other lounge room needs you would be hard pressed to find a smaller or more economical solution that still lets you flex your techie muscle to a satisfactory level.

Specifications:

933MHz C3-E series CPU; VIA CLE266 chipset; 5.1 audio; 10/100 Ethernet, SP/DIF, one DIMM, S-Video Out, USB 2.0; IEEE1394.
Website: VIA www.viavpsd.com
Supplier: BCN Technology www.bcntech.com.au
Phone: BCN Technology (02) 9648 0039
Price: $349

9.5/10

THE JOURNEY STARTS HERE...

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Hercules DV Action! Pro

Sometimes getting all the necessary components together to edit your home movies demands a full moon, a week of ritualistically flogging oneself with a faggot of birchwood twigs, and a chalice of virgin's blood. Aside from the virgin's blood, all of that stuff is hard to come by, so fortunately Hercules has bunged everything you need into one box.

The DV Action! Pro provides all you need to start cutting your movies in digital and then output to DVD, with a three-port FireWire PCI capture card, the ShuttlePRO editing controller and MediaStudio Pro 6.5,

MediaStudio is a solid editing suite with 99 video and audio tracks and a bundle of capturing features. It has a great range of effects and with plug-in software like Adorage and Cool 3D you'll be star-wiping your way to Industrial Light and Magic. The interface is busy but it does provide the essential features.

All the necessary tools are here for some excellent results, but MediaStudio won't replace suites like Adobe Premiere, as it lacks the intuitive operation that any creative process demands. The ShuttlePRO unfortunately doesn't alleviate this condition. It does all it's told to do flawlessly but one never really becomes 'one' with the shuttle. Jogging frame-by-frame was superb when fine cutting, but shuttling was slow. We expected to whiz along the timeline like roller-skating on golf balls, but instead were treated to a Valium-donkey ride.

Hercules has put together a decent package that meets the essential needs for home-editing enthusiasts and the price is good if you are already impressed with MediaStudio or have a penchant for shuttles.

Specifications:

Three-port FireWire PCI card; ShuttlePRO controller; Ulead MediaStudio PRO 6.5; Adorage; Cool 3D & Ulead DVD plug-in.
Website: Hercules www.europe.hercules.com
Supplier: Hercules www.europe.hercules.com
Phone: Hercules (02) 8303 1818
Price: $329

7.5/10

Hewlett Packard iPAQ H5450 Pocket PC

Atomic doesn't often look at PDAs, as they generally don't get our nipples hard – the response is usually more semi-flaccid. However, every now and then there comes a PDA that has our areolas pulling their finest impression of the pyramids of Egypt. The H5450 is one such PDA, and here's why.

The most obvious coolio feature of this PDA is its biometric finger scanner. You heard right: this PDA has its own finger scanner. And best of all, it actually works! With this feature activated you can be sure your sensitive documents are going to stay private. If you're silly enough to grind the finger you used into mince meat, and thus can't use the finger scanner, you'll have to wipe the entire memory of the unit, losing all applications and data. So you know for certain that even if you lose the unit, there is no way for anyone else to view your files.

The other highlight that sets this unit apart from the rest are its connectivity features. First off the bat is integrated Bluetooth support, allowing you to pair it up with a compatible mobile phone for dial-up network access. Even more impressive than this is its integrated wireless LAN support. The H5450 supports the 802.11b protocol, and is no more difficult to set up to run off your wireless LAN than a standard PC.

Other than these features the H5450 is a fairly stock standard iPAQ Pocket PC, which is no bad thing. The 400MHz PXA250 XScale processor, matched with 64MB of built-in memory and 48MB of ROM ensures that using the H5450 is a quick and lag-free affair.

The only thing that's going to hold back prospective PDA buyers from purchasing this device is its cost. At $1,499, it's one of the most expensive PDAs on the market.

Thankfully its comprehensive suite of functions, which you'll mostly find useful, unlike certain other PDAs, still makes it a compelling purchase.

Specifications:

400MHz PXA250 XScale processor; 64MB RAM; 48MB ROM.

Website: Hewlett Packard www.hp.com.au
Supplier: Hewlett Packard www.hp.com.au
Phone: Hewlett Packard (02) 8394 7088
Price: $1,499

8.5/10

Athlon XP 1800+ Thoroughbred B

The chip that AMD lovers really love right now is the Thoroughbred B version of the Athlon XP. To make sure you have a Thoroughbred B Athlon XP, check the ordering code of the CPU (usually found on the Website of most reputable retailers). The Thoroughbred B has an ordering code of AXDA1800DUT3C. There are two grades of Tbred B: low grade and high grade. The high grade promises the most potential for overclocking; unfortunately these aren't currently available in Australia in the 1800+ speed, at least according to Compucon (www.compucon.com.au), the very kind supplier of our review Tbred B. To tell what grade your Tbred B is, look at the second line of the processor code – if it begins with A it's a high end, while J is for the low end. The lowest speed Tbred B that you'll find is the 1700+, but these are being phased out so they'll soon be rare, which is why we tested with the 1800+. Could the 1800+ impress us anywhere near as much as the free performance boosts we've been wringing out the P4? Not quite.

The 1800+ runs at a default speed of 1.53GHz with a voltage of 1.6V. The old pencil trick allowed us to fudge with the multiplier without worrying about stressing the rest of our system. We managed to increase the multiplier from its default of 11.5 up to 14, and tweaked the FSB on our AT7 MAX2 up to 140MHz to get the CPU running at its maximum stable speed of 1,960GHz. It was necessary to increase the voltage up to 1.85V to maintain this speed. We gave it a quick run through 3DMark03's CPU test to see the kind of performance gain you could expect from such an overclock.

At default speed it scored 378 CPU points, while at the overclocked speed it scored 436.This is an overclock of around 28%, lifting it to the speed of the Athlon XP 2400+, which would normally set you back around $300. Considering you'll only pay around $170 for the 1800+, this is a very nice saving in cash. Sadly for AMD, it's still not quite as impressive as the 50% overclocks that many C1 P4 owners are getting, but it is great value for the cash strapped gamer.

Specifications:

0.13-micron process; 256KB L2 cache; 266MHz FSB; 1.53GHz clock speed.

Website: AMD www.amd.com
Supplier: Compucon www.compucon.com.au
Phone: (02) 9494 5888
Price: $170

Joytech 5.6in TFT colour monitor

Joytech's 5.6in TFT monitor for the PlayStation 2 is a healthy reminder that gaming peripherals need not be restricted to joysticks and wheels. This is a tiny screen that bolts onto your PS2, eliminating the restriction of gaming within cable distance of your television.

Making use of mounting points on the back of your PS2, the unit sits on the back the console and provides a 5.6in TFT screen and two speakers. It can fold down on top of the PS2 to make it easier to transport, looking remarkably like a Game Boy Advance SP on major doses of horse steroids.

If you wish to use headphones or other speakers, then a range of connectors sit on the back of the unit as well. It even has video inputs so you can plug your VCR, PC or any other eye candy generator into the back.

It is an amazingly different kind of product, albeit with niche appeal, and in practice its usefulness will come down to the kind of games you like to play. Because the screen is so small, anything that relies on reading swags of text becomes a painfully squinty affair. The screen is quite colourful and crisp, but Joytech does tout a viewing angle of 160 degrees, which appears very optimistic as even slight changes in angle result in diminished image quality, no matter how much contrast tweakage you do.

This could be the perfect tool to turn your PS2 mobile, except it is hampered by the need for mains power, tethering it to the wall.

A car power adaptor for the TFT and PS2 could make it a great boredom killer on long journeys, or an extra way to pick up chicks when cruisin' the Bondi beachfront on a Friday night – but motoring would be the limit of portability.

Joytech has entered the Aussie market with a very different kind of product, however its niche appeal and high price tag mean that unless mobility is a factor, gamers would be better off buying themselves a second television.

Specifications:

5.6in TFT screen for the PlayStation 2; stereo speakers; video inputs; two headphone outputs.

Website: Joytech www.joytech.net
Supplier: Take 2 Interactive www.take2games.com
Phone: Take2 Interactive (02) 9482 3455
Price: $299.95

8/10

MSI FX 5800 Ultra

Bennett Ring reckons the only thing ultra about this card is its price.

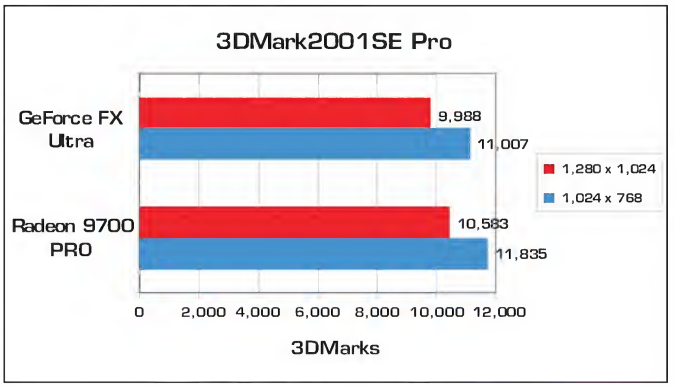
Poor NVIDIA. It must be hard to be on top for so long, only to have your dominance wrenched away like a lollypop from a spoilt brat. And judging by NVIDIA's pedantic reaction to Futuremark's 3DMark03, in which the GeForce FX-series performs badly, NVIDIA is indeed acting like a spoilt brat. In *issue 27* we took a look at the GeForce FX 5800, and ended up feeling rather disappointed. However, we've now had a play with the faster GeForce FX 5800 Ultra – but can it be NVIDIA's proton torpedo to take down the RADEON 9700 PRO Death Star?

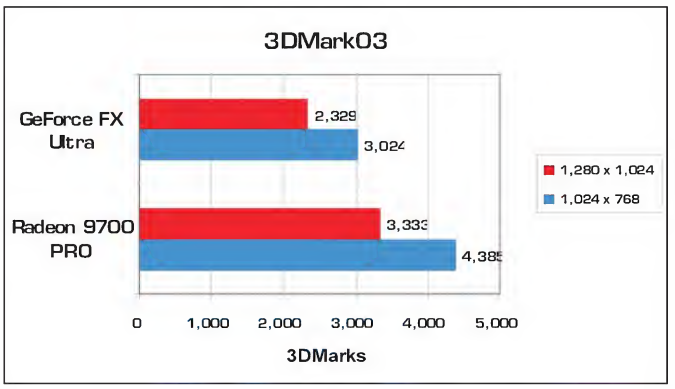
The only difference between this card and the plain-Jane GeForce FX 5800 is the speed of the core and memory. The GeForce FX 5800 runs at a synchronous memory/core speed of 400MHz, while the Ultra cranks this up a notch to run synchronously at 500MHz. We tested the Ultra with the Athlon XP 1800+ on a VIA KT400 motherboard with 512MB of DDR-RAM. And the results were even more disappointing than anticipated.

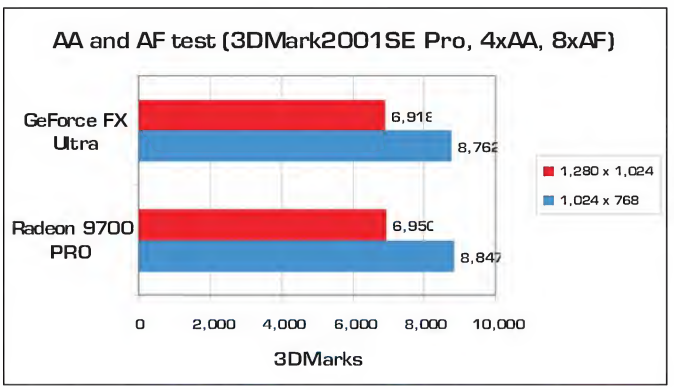
The first cab off the benchmark rank was ye olde faithful 3DMark2001SE Pro; at 1,024 x 768 and 1,280 x 1,024 resolutions the RADEON 9700 PRO outpaced the GeForce FX 5800 Ultra by an average of around 7%. Hmmm, things are already starting to look bad for a card that costs almost twice as much as the RADEON. Next up was 3DMark03. While Futuremark requests that this benchmark is performed using publicly available drivers, we felt sorry for NVIDIA, so we used its recommended beta 43.00 drivers. We also tested with the publicly available 41.09 drivers, and only noticed a performance decrease of a couple of percent. If you thought the Ultra performed poorly in the '2001 benchmark, its '03 results rival that of a legless beggar dragging itself around on a little trolley. Once again it lost at both resolutions, but this time it was more of a total and utter thrashing than a small loss. The Ultra managed to perform a little better in Code Creatures, one of the most demanding DX 8 benchmarks currently available, but it wasn't by the largest of margins, at around three to four percent. The final test focused on antialiasing and anisotropic filtering performance. Both cards were neck-and-neck in this test, which is probably the most pleasing result of all of the benchmarks. One of the biggest complaints of the GeForce FX 5800 Ultra is the howler of a cooler, but the final production card was supposed to introduce a slightly quieter version. Well, it is slightly quieter, but still manages to give the Delta fan a good run for its money.

When it came to overclocking, we weren't expecting much of this extremely hot video card. To our dismay, we couldn't overclock the card at all. We tried using both MSI's own overclocking utility and the latest version of PowerStrip, but neither allowed us to increase the core or memory speeds. Bummer.

This card might have been brilliant – if it'd been released six months ago. Unfortunately it now has to compete against a card that is, in most cases, faster at around the half the price.







Specifications:

0.13-micron manufacturing process; 128MB DDR-II memory at 500MHz; NV30 core.

Website: MSI www.msi.com.tw
Supplier: MSI www.msi.com.tw
Phone: MSI (02) 9748 0070
Price: $980

5/10

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- ports

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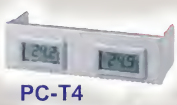
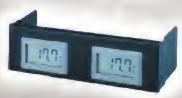


PC-T4



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Panel-65
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Panel-75
Left side window panel for PC-70USB Case
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Panel-75B

Panel-65B
Black Left side window panel for PC-61USB Case
$75.00 RRP

Panel-75B
Black Left side window panel for PC-71USB Case
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$19.00 RRP

MF-30

PC-M2

PC-M2B

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Creative I-Trigue 2.1 3300

2.1 Speaker sets aren't ideal for immersive gaming environments or home cinema as you don't get the whole surround sound experience without rear and center channels. It's interesting then that manufacturers are still releasing 2.1 sets, when 5.1s and 6.1s are so affordable. But that doesn't mean a 2.1 set can't offer a reasonable sound solution, particularly with the quality Creative consistently achieves.

The subwoofer contains a 6 1/2inch long-throw driver and a dual flared port tube, and pumps out 25W RMS. It is a standard cube, similar to the sub seen in the Inspire range. There are no controls on it, not even a power switch, and it is designed to be shoved under a desk or in the corner. The satellites comprised of three 3W RMS Titanium drivers and housed in die cast alloy casings, really need to be seen. With or without the black mesh grill in place, they look classy and expensive.

Also supplied is a wired remote, providing on/off, volume and bass level controls as well as headphones output.

These speakers sounded every bit as sweet as they look when we tested them with a range of audio sources, from MP3s to DVDs and a spot of Raven Shield gaming. The clarity was amazing, the bass was solid and responsive and the mid to upper tones were sharp, clear and natural. The wide stereo field was delivered with pinpoint accuracy. It was a shame we couldn't listen to a 5.1 set to really round out the surround effects.

It's hard to compare sound quality with price or jazzy looks, as evidenced with the JBL speakers reviewed below. Conversely, considering the price, we were not expecting sound this good. Overall, this speaker set is a classy offering from Creative.

Specifications:

TPO 80W; frequency response 20kHz – 30Hz; signal-to-noise ratio: 80dB.

Website: Creative Labs australia.creative.com
Supplier: Creative Labs australia.creative.com
Phone: (02) 9666 6100
Price: $229

9/10

JBL Creature 2.1 Speakers

JBL has been manufacturing professional sound equipment since the 1940s. Its range sits at the higher end of the sound system market, and is generally priced accordingly. But none of that explains the logic behind these speakers. Oddly named 'Creatures', this 2.1 set was disappointing. We expected much better from JBL, especially considering the $299 price.

Its appearance is plain bizarre, almost novelty-like, and it is available in three different colours: silver, blue and white.

The packaging says 'Self powered' but this is not the case – this set requires mains power through the supplied transformer.

The 8watt satellites and 20watt subwoofer housings are constructed from plastic and magnetically shielded.

Testing comprised of a DVD title, a range of MP3s and a few rounds of Battlefield 1942. Sound quality was disappointing: the mid tones were noticeably hollow and the high tones harsh. The subwoofer, comprising of a 4inch magnum transducer at the base, provides bass and treble controls. We found that adjusting the treble at anything higher than half way produced tones that were almost uncomfortable to listen to. The bass control only served to thicken up an already muddied bass sound.

The satellites, which use an Odyssey Plus transducer, do throw a wide sound field, which at lower volume is fairly crisp and clear, but anything louder became distorted and noisy. The volume controls are also located on the satellites, by way of a capacitance operated touch button (think 'touch lamps').

We found little to impress, except perhaps the green LEDs in the base of the units, which cast a cool *Atomic* green light.

Whether you like the design or not is subjective. But good looks and high price don't translate to good sound. Much better models can be found at that price.

Specifications:

Subwoofer: 24W Satellite – 8W at 10% (THD+N); frequency response: 50Hz – 20kHz.

Website: JBL www.jbl.com
Supplier: Conexus www.conexus.com.au
Phone: Conexus (02) 9975 2799
Price: $299

3/10

Cooler Master XDream Special Edition HSC-V83

Cooler Master has established itself as the company to beat when it comes to designer PC cases. The same can't be said about its range of heatsink fan units – the units are good, but certainly not the best on offer. Its new HSC-V83 cooler certainly looks the part, but can it compete with the Thermalrights of the world?

The HSC-V83 is suitable for Socket A, 370 and 462 mounts, and uses the proven Copper skived construction, with the main heatsink being 100% Copper. As a result it's quite heavy, weighing just over 600 grams. It uses the standard socket clips, a relief when you consider our past experiences with HSFs that use the four motherboard holes found on AMD motherboards. The clip is nice and tight, but not so tight that you'll be risking a crushed core when you mount it.

The included 80mm fan is painted a faux-Copper colour, and includes a fan speed controller. Top speed is 4,800rpm, which doesn't sound too fast, but at this speed it's definitely a howler to rival any of the Delta fans. Thankfully at its lowest speed of 2,000rpm it's practically silent, but at this speed performance takes a massive hit. We tested this unit on our custom HSF test rig Chernobyl, set to output 80W of heat via the simulated AMD CPU die. Ambient temp was a constant 19ºC during the test.

With the fan set to maximum speed, the HSC-V83 posted an impressive temperature of 50ºC. Lower the fan to 2,000rpm though, and it's a different story. At this speed the temperature skyrocketed to 71ºC – far too hot to be of any use. We also benchmarked the Thermalright SLK-800 HSF, our current HSF of choice, to see how the Cooler Master compared. The SLK-800 was 4ºC cooler than the HSC-V83, with a max temp of 46ºC.

While the HSC-V83 has respectable performance levels, it's clear Cooler Master still has work to do to claim the #1 spot. Considering the low price when compared to the Thermalrights of the world, it's a worthy candidate for those on a budget.

Specifications:

Copper; fan speed adjustor (2,000–4,800rpm); Socket A / 370 / 462 compatible.

Website: Cooler Master www.coolermaster.com
Supplier: Australia IT www.australiait.com.au
Phone: (03) 9543 5855
Price: $49

7.5/10

cnc-cpu ST80A

In this day and age of super hot processors and Copper coolers, it's refreshing to see an HSF that shuns the use of Copper and instead uses trusty Aluminium. Actually, 'refreshing' probably isn't the right word – damn stupid is a better phrase. Yes, we're being harsh already, so you can probably guess where this review is headed. . .

For an Aluminium heatsink, this beast is surprisingly heavy, weighing in at a chunky 380 grams. This is probably a direct result of this HSF being damn huge, so you'll need to make sure you're going to have enough room on your motherboard to fit it.

According to the Aussie maker, the special feature of this product is the way it's built. The CNC in the name stands for Computer Numeric Control, and refers to the fact that each HSF is carved out of a solid block of Aluminium by a computer-controlled machining process. It's certainly a bizarre looking heatsink, with hundreds of 'tunnels' bored through it, perhaps in an effort to improve the airflow. The maker also claims that it's 'Non-audible (depending on thermal requirements and fan used)' – yet it ships with a Delta FFB0812EHE 5,700rpm 80mm fan that has to be the loudest we've ever heard.

We checked out the Socket A version of this heatsink, and it had a strange mounting mechanism. You slide the two lugs over the usual clip on the socket, and then have to remove a pin from each clip. This in turn releases a couple of springs, theoretically tightening the heatsink mount. We say 'theoretically', because it still seemed to be a very loose fit. This might account for its lacklustre performance.

Chernobyl was fired up at 80W with the Athlon CPU die in place, and an ambient temperature of 19ºC. We compared it against our current favourite, the Thermalright SLK-800, expecting the worst. How could an Aluminium HSF with a fairly loose fit ever compete? And we were 100% correct. While the SLK-800 came in at a chilly 46ºC, the ST80A peaked out at 21ºC hotter, reaching 67ºC. Not good.

With this performance we can't recommend this product at all. It's a shame, as we all want Aussie manufacturers to succeed, but they're going to have to do better than this.

Specifications:

74mm x 83mm including clips; Aluminium heatsink construction.

Website: cnc-cpu www.cnc-cpu.com
Supplier: Below-0 www.below-0.com.au
Phone: Below-0 07 3348 2155
Price: $95

5/10

Mitsubishi DV172

Innovation in technology is a grand thing. Without it, we'd all be stuck with blurry TFT monitors that totally sucked when gaming. Not any more. Thanks to the release of 16ms pixel response time TFT monitors, flat panel screens are now cool. The Mitsubishi DV172 is the latest of these beasties to get a run in the *Atomic* Labs, but can it match the beauty of the Hitachi CML174SXW we wanted to procreate with last month?

The screen quality compares favourably (if not in its favour) with the Hitachi model: you'll need a dark pair of sunnies as its 500:1 contrast ratio and 260cd/m² brightness make it incredibly bright. This 500:1 contrast ratio is superior to the CML174SXW, which is rated at 400:1. Both monitors have an identical pixel size of 0.264mm, and run at a native resolution of 1,280 x 1,024, which is the sweet spot for owners of high-end video cards such as the RADEON 9700 PRO and GeForce FX. Unfortunately, the display looked woeful running at 1,600 x 1,200, with much distortion of the onscreen text and images.

We gave the DV172 a quick bash in DisplayMate, and it passed all the image quality tests with flying colours, bar one. Its dark-grey scale test only scored a 7/10, as the darker greys tended to merge into the black background. Other than this small complaint, the DV172 was visually impressive: the colours were brilliantly vibrant, while pixel accuracy was breathtaking.

Games looked absolutely crisp and clear, with only the slightest hint of blurring in fast, bright games. For most games, you won't even notice you're playing on a TFT. DVD quality was likewise perfect, perhaps even slightly more impressive than the gaming performance.

If there was ever a time to seriously consider upgrading to a TFT, that time is now. And at a $100 cheaper than the Hitachi, we happily give the DV172 the big thumbs up.

Specifications:

1,280 x 1,024 Pixel Thin-Film Transistor LCD panel; 16ms pixel response time.

Website: www.mitsubishi.com
Supplier: Mitsubishi www.mitsubishi.com
Phone: Mitsubishi (02) 9684 7777
Price: $1,099

9/10

VideoLogic ZXR-550 5.1

Back in *issue 20* we reviewed Videologic's ZXR-500 system, and we loved it. The new ZXR-550 is a direct upgrade and out of the many speaker products we've reviewed it's probably the most convincing positional audio. The wooden sub sports dual flared ports and provides a master volume control and volume controls for centre, rear and sub channels. The satellites are identical to those in the ZXR-500 and come supplied with stands.

With the 5in sub pumping out 25W RMS and the five 3in satellites giving 8W RMS each, this system is damn loud and closely matches the ratings of the 500s. However, the frequency response is not so wide at 35Hz – 20kHz. During testing with a few MP3s, we were pleased to hear a warm and responsive bass, comfortable and smooth mid tones, and crystal clear upper tones. Unfortunately the sound wasn't so pretty at higher volumes: the upper tones became harsh and a little distorted, the mid range lost some clarity and the bass kick seemed less responsive. To be fair, this was at ear-bleeding volumes you're unlikely to need for music appreciation at home.

These speakers held their ground during gameplay, with the sound of gunfire and rockets benefiting from the extreme volume and awesomely realistic 5.1 positional audio delivered by the well tuned satellites. Their real power was apparent watching *Behind Enemy Lines* on DVD: rich bass complemented smooth and clear mid to upper tones, even during the intense action sequences.

Once again, Videologic has delivered a very competent and very impressive sound system. Bung a Dolby Digital decoder into the mix, and it may even get 10 out of 10.

Specifications:

Total power output: 65W RMS; frequency response: 35Hz – 20kHz.

Website: www.videologic.com
Supplier: Westan (www.westan.com.au)
Phone: Westan (03) 9543 7733
Price: $249

9/10

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Digitrex DVD Player	$180

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Aopen 48x12x50	$95
Asus 48x24x52	$85
Asus 52x24x52	$95
LG 52x24x52 OEM	$99
LG 48x24x48x16Combo	$175
Liteon 48x24x48	$85
Liteon 52x24x52	$95
MSI 48x24x48	$90
Pioneer DVR-A05	$585
Pioneer DVR-A05 OEM	$540
Plextor DVD+RW 4X	$699
Sony 52x24x52 OEM	$119
Sony DRU500	$755

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Coolermaster 8cm	$15
Coolermaster 8cm Smart	$20
Coolermaster Duron fan	$13
Coolermaster HHC001	$69
Globalwin WBK38-II	$45
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Volcano 6CU+	$45
Volcano 7	$49
Volcano 7+	$55
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Volcano 9 Coolmod	$55
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Orange Orb	$25
Crytal Orb	$35
Thermaltake Smartfan	$25
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XP Copper Shim	$10
Hardcano 3	$69
Hardcano 5	$79
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JUSTCOOLER	
6/8/9cm Case fan	$15
HDD Cooler Hd815	$19
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ANTEC	
Antec Trilite Fans	$25
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Antec Smart fans 8/9CM	$29
Antec Smart fans 12CM	$32
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CNPS3000-Plus	$49
CNPS-3100-GoldPlus	$85
CNPS3100-Plus	$59
CNPS-5700D-Cu	$69
CNPS6000-ALCU	$59
CNPS6000-CU	$69
CNPS6500B-ALCU	$69
CNPS6500B-CU	$89
ZM-50HP	$45
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ZM-F1 8cm fan	$19
FB-123 9cm fan	$20
Fanmate1	$15

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Altec Lansing Headsets	
AHP5	$25
AHP10	$30
AHS20	$35
AHS30	$40
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Everglide Attackpads	$39
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Sennheiser HD202	$69
Sennheiser HD212PRO	$129
Sennheiser HD280PRO	$349
Sennheiser HD437	$69
Sennheiser HD457	$99
Sennheiser HD477	$139
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Sennheiser HD500	$249
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IBM 120GB	$310
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Maxtor 40g ATA133	$150
Maxtor 60g ATA133	$165
Maxtor 80g ATA133	$195
Maxtor 120gb ATA133	$295
Seagate 20gb(5400rpm)	$120
Seagate 40g b	$140
Seagate 60g b	$155
Seagate 80g b	$185
Seagate 80gb SATA	$245
Seagate 120gb 2mb	$259
Seagate 120gb 8mb	$295
Seagate 120gb SATA	$330
Special Edition 8mb	(3YR)
Western Digital 40gb	$160
Western Digital 60gb	$185
Western Digital 80gb	$210
Western Digital 120gb	$299

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Antec SX835-II 350w	$180
Antec SLK-1600 300w	$110
Antec SLK-3700 no psu	$175
Antec 660AMG 330w	$199
Antec 1000AMG no psu	$180
Antec SX-1040B-II 400w	$220
Antec 1080AMG 430w	$245
Antec Lanboy	$199
Aopen H400 200w	$110
Aopen H340D P4180w	$115
Aopen H450 P4 250w	$115
Aopen H500 P4 250w	$130
Aopen H700 300w	$210
Aopen H600A(300w)	$165
Aopen H600B(300w)	$175
Aopen HQ08P4(300w)	$180
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Lian-Li PC6087A	$380
Lian-Li PC6089A	$380
Lian-Li PC70 Full Tower	$450
Thermaltake Xaser5000	$249
Thermaltake Xaser6000	$320

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Belkin Classic Black	$28
Belkin Ergo Black	$25
Logitech Dual Optical	$79
Logitech First Wheel oem	$25
Logitech Wheel Ms Opt oem.	$35
Logitech Wireless Ps2 oem	$50
Logitech Mx 300	$75
Logitech Mx 500	$90
Logitech Mx700 Wireless	$160
Microsoft Intellimouse Ps2	$19
Microsoft Intellimouse Web	$25
Microsoft Intelimouse Opt	$50
Microsoft Wheelms Opt	$35
Microsoft Explorer Opt v3	$65
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Viewmaster PS/2 Scroll	$15

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BTC 8190 Office	$35
Logitech Internet Navigator	$69
Logitech Elite Black Kb	$95
Logitech Elite Duo	$185
Logitech Access	$49
Logitech Cordless Access	$95
Logitech Access Duo	$140
Logitech Comfort Duo	$220
Ms Multimedia Keyboard	$80
Ms Natural MM Keyboard	$115
Ms Office Keyboard OEM	$65
Ms Optical MM Combo	$65
Mitsubishi Multimedia	$35
Mitsubishi Multimedia Black	$40
Ms Desktop Wireless	$180
Microsoft Desktop Pro	$195
Mini Silver Keyboard USB	$65
Mini Black Keyboard Ps2	$40

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V8170 MagicMX440TV 64mb	$125
V8170 MagicMX440TV 128mb	$185
V9180 Gf4 64mb MAGIC	$175
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V9280 Gf4 128MB 8x	$355
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V9280 Gf4 128mb Superfast	$440
V9480SE-TVD Ti4800 VIVO	$495
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ATI Rage 128 Pro 32mb	$50
Radeon 9000 64mb	$135
Radeon 9000 Pro 64mb	$195
Radeon 9000 Pro 128mb	$225
Radeon 9500 64mb	$350
Hightech Mx400 PCI 64mTV	$160
Hightech Radeon AIW 9000	$385
Hightech Radeon 9500 128mb	$450
Hightech Radeon 9700 Pro	**$649**
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Gf4 Mx440 64mb TV SE	$120
Gf4 Mx440 64mb 8x TV	$195
Gf4 Mx440 64mb 8x VIVO	$210
Gf4 Ti4200128mb VIVO 8x	$350
Gf4 Ti4800SE 128mb VIVO	$450
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Sapphire Radeon 9500 Pro	$395
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Aopen 56k v.90 Ext	$75
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D-Link DSL-504	$355
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Dynalink 56k external	$85
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Netcomm Rave 56k USB	$99
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Asus A7N8X Deluxe	$300
Asus A7V333	$165
Asus A7V8X	$175
Asus A7V8X Raid GBLAN	$280
Asus P4G8X/AL	$450
Asus P4G8X GOLD DLX	$495
Asus P4S8X-X	$175
Asus P4S8X RAID	$265
Asus P4PE	$180
Asus P4PE RAID-GBL	$299
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ECS P4S5A/DX	$125
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8IEXP	$240
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8LD533/ 8LS533	$135
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8PE667 Pro	$190
8PE667 Ultra 2	$330
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8SQ 800	$195
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7VA-C (Kt333)	$140
7VA	$165
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K7N2L Nforce2	$199
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FLYVIDEO 2100 LP	$115
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Pinnacle Studio PCTV	$120
Pinnacle Miro Dc10+	$445
Pinnacle Studio DV+	$455
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Epson Stylus C41UX	$105
Epson Stylus C41SX	$150
Epson Stylus C61	$185
Epson Stylus 1160	$540
Epson Photo 830	$290
Epson Photo 915	$395
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HP Deskjet 3420	$120
HP Deskjet 3820	$160
HP Deskjet 5550	$220
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HP Laserjet 1000	$450
HP Laserjet 1200	$700
Kyocera Fs1010	$620
Panasonic Kx7100	$395
Xerox 3110 10ppm	$350
Xerox 3210 12ppm	$520
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HP Officejet PSC2210	$499
HP 1000/1200 Toner 2.5k	$119
HP 1000/1200 Toner 3.5k	$169

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Canon Lide20	$150
Canon 1250U2F	$230
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HP Scanjet 3500	$190
HP Scanjet 3570	$285
HP Scanjet 4500	$325
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Epson 1260	$185
Epson 1260 Photo	$230
Epson 1650	$315
Epson 1660 Photo	$345
Epson Photo 2400	$435
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Power VS-II 500Va	$150
OPTI-UPS 525BT	$180
OPTI-UPS 420ES	$350
OPTI-UPS 650ES	$450
OPTI-UPS 1400ES	$790
APC UPS Pro 280	$280
APC UPS CS500VA	$255
APC UPS ES350VA	$195
APC UPS ES500VA	$275
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Truepower 550w	$195
Trueblue 480w	$185
Codegen 350/450w	$45/$65
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Justcooler 300/400w	$90/130
Zalman 400w	$169

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Intel 8460C 10/100	$70
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Surecom 10/100 PCI	$20
Genius 10/100 PCI	$20
Cnet 10/100 PCI	$20
Netgear FA-312	$50
Dlink DFE-530TX	$45
Netgear Fs105	$125
Netgear FR114P Router	$295
Linksys Router + 4 port	$135
Dlink DI-704	$195
Dlink DWL-900AP+	$295
Dlink DI-614+	$395
Dlink DWL520+	$175
Dlink DWL650+	$145
Netgear FM114P	$450
Netgear FR114P	$295
Netgear Rp614	$199
Surecom 5port Switch	$60
Surecom 8port Switch	$65
Compex 10/100 USB	$55
Netgear Ps110 Printsvr	$250
Surecom PCMCIA 10m	$90
Surecom PCMCIA 100m	$80

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XP 2000+	$165
XP 2100+ B Core	$185
XP 2200+	$215
XP 2400+	$285
XP 2600+	$475
XP 2700+	$525
Celeron 1.7G (478)	$110
Celeron 1.8G (478)	$135
Celeron 2.0G (478)	$165
Intel P4 2.4B	$325
Intel P4 2.53	$375
Intel P4 2.66	$475
Intel P4 2.8	$715
Intel P4 3Ghz	$1150

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XMS2700 256mb	$185
XMS2700 512mb	$370
XMS3000 256mb	$200
XMS3000 512mb	$380
XMS3200 256mb	$220
XMS3200 512mb	$395
XMS3500 256mb	$265
XMS3500 512mb	$440
KINGMAX(LIFETIME)	
PC2700 256mb	$80
Pc3200 256mb	$140
Pc2700 512mb	$165
Pc3200 512mb	$220
128mb PC-133 SODIMM	$85
256mb PC-133 SODIMM	$165
KINGSTON(LIFETIME)	
Kingston Pc2100 256mb	$75
Kingston PC2700 256mb	$85
Kingston Pc2100 512mb	$150
Kingston PC2700 512mb	$170
Kingston HYPERX	$$$
256mb RDRAM Pc800	$185
128mb RDRAM 1066	$145
256mb RDRAM 1066	$295
128MB PC133 SDRAM	$55
256MB PC133 SDRAM	$75
512MB PC133 SDRAM	$150
Lemel Pc2700 256mb	$70
Ramos PC2700 512mb	$140
Transcend Pc2700 256m	$120
Samsung 256mb pc2700	$85
Samsung 512mb pc2700	$165
Apacer 256mb pc2700	$85
Apacer 512mb pc2700	$170

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Microsoft Win2000 Pro	$310
Microsoft Office XP Pro	$475
Microsoft Office SBE	$380
Microsoft Work Suite 2001	$140
Microsoft Work Suite 2002	$160
Norton Anti Virus 2003	$45
Roxio Easy CD Creator v5	$25
Power DVD XP v4.0	$15

USB/1394 DEVICES

Surecom 4port HUB	$45
Swann Ezy 4p USB Hub	$45
\2.5" USB 2.0 & 1394	$165
LG USB Pendrive 64mb	$115
USB Pen drive 32mb	$70
USB Pen drive 64mb	$100
USB Pen drive 128mb	$140
USB Pen drive 256mb	$210
USB 40x12x40 Liteon	$285
USB 2.0 External 3.5	$150
USB 2.0 & Firewire 3.5	$165
5.25 Firewire External	$195
Easy USB2.0 2.5HDD	$95
Leadtek 128mb USB	$150
Apacer Audiosteno 128	$275
Apacer 6-in-1 Int. USB	$65
Apacer 6-in-1 Ext USB	$65
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Pinnacle PCTV Deluxe

'PCTV' is a catchy name for Pinnacle's new TV tuner, but 'Deluxe' makes us a bit wary. Like those triple-layer subzero-gravity push-up bras, the 'deluxe' version has you craving the wrapper more than what you find inside. But with true stereo reception, a funky IR remote offering more buttons than a US President could press and some neat software, maybe Pinnacle's Deluxe label really is deserved.

The PCTV plugs into the USB port (2.0 or 1.1) and your TV antenna into the PCTV. The lack of a paper-manual was worrying, and after installing the apps it seemed there would be the inevitable hitch. Fortunately, after auto-tuning the channels there was nothing to do but watch some telly. Of course, there's that weird moment of introspection when watching TV on a PC only ten feet from the lounge room and a warm couch-girlfriend combo, but when you press Record or the TimeShift button you shake away any doubts and make a mental note to take a sledgehammer to the VCR.

The PCTV's image is sharp, with none of the fuzzy ghosting effect or the flatness that other tuners suffer, and adjustable levels also help fine-tune the image.

The TimeShifting feature is quite simply awesome. Pinnacle delivers a quality image that uses MPEG-1 or MPEG-2 compression to do TimeShifting justice with no jittery laggy video or unsynchronised audio.

Aside from recording and watching TV, there is the ability to input other analog sources. The PCTV box happily swallowed video from a VHS deck and a DVD player – including programs that were copy-protected. Woot. The quality of the DVD recording setting, like those captured from the tuner, is not blindingly crisp, but it's acceptable.

Pinnacle states you can create VCDs, SVCDs and DVDs with this kit, but the lack of menu creation software, and only the ability to encode or convert video files into the appropriate format, make that a shrewd overstatement that mars an otherwise great tuner/capture package.

Specifications:

Coaxial antenna; S-Video; composite and audio inputs; PAL and NTSC compatibility; and TeleText .

Website: Pineapplehead www.pineapplehead.com.au
Supplier: Pineapplehead www.pineapplehead.com.au
Phone: Pineapplehead 1800 657 601
Price: $549

8.5/10

Sapphire ATLANTIS 9700 PRO Ultimate edition

Well, it looks like someone wanted to show up NVIDIA's latest blowdryer-cum-video card. The ATLANTIS 9700 PRO aims to prove that you can still have an extreme graphics card, unaccompanied by a wailing banshee when 3D apps kick in.

If you travel back to *issue 22* of *Atomic*, you'll find a review of Zalman's silent heatpipe cooler for video cards. We liked it. Lots. Obviously, Saphhire liked it too, as this cooler is strapped onto the ATLANTIS 9700 PRO. To refresh, this heatsink is just two massive slabs of Aluminium joined by a Copper heatpipe. Fans are absent, making it silent when in use.

We were a little skeptical on whether this passive cooler could tame the raging heat of ATI's R300 chip, as the R300's large transistor count isn't exactly synonymous with low temperatures. The card was installed in a standard PC inside a Lian Li case without any case fans operating to help remove heat.

A quick boot up after installation had the PC whooping and bleeping, and after consultation with the manual, we decided it was warning of an overheating CPU, rather than approaching aliens. After checking the temps of our 2.7GHz overclocked Pentium 4, a temperature increase of around 8°C was found – a result of the passive heatsink sucking warmth from the GPU. This heat rises directly to the CPU heatsink. Certainly not a high enough rise to crash our PC, and a quick re-adjustment of the CPU warning temp solved the problem. For overclockers though, this card will cause your CPU to swelter just that tiny bit more. If your mobo is mounted horizontally this shouldn't be much of a problem, although your case temps will increase a fraction.

Once we knew the card still functioned, it was time for the overclocking test. The core peaked out at 360MHz, just over 10% faster than the default speed of 325MHz. The memory faired identically, hitting a maximum stable speed of 340MHz, 10% faster than the default speed of 310MHz.

In light of the GeForce FX's howling solution, the ATLANTIS 9700 PRO will rub NVIDIA's nose in more of the smelly stuff, proving that having a chunky air conditioning unit for a heatsink is just not cool.

Specifications:

R300 core; 128MB DDR-RAM; and Zalman heatpipe cooling system.

Website: Sapphire www.sapphiretech.com
Supplier: Achieva www.achieva.com.au
Phone: Achieva (02) 9742 3288
Price: $650

8.5/10

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Soltek Qbic 3000M

2003 will forever be known as the year of the mini-barebones system. Riding high on Shuttle's success last year with its XPC line are numerous manufacturers who will be releasing similar systems over the next few months. One of the first contenders is Soltek, with its i845GE based Qbic mini-barebones system for the Pentium 4.

In a market created and owned by Shuttle, barebones-making newbies are faced with a need to differentiate themselves and Soltek has done this by adding two 5.25in drive bays to the Qbic 3000M, making the unit much taller than others on the market and providing more configuration flexibility than single bay models.

Internally the design screams reverse engineering, however there are one or two annoying design flaws that hamper the unit from reaching its full potential.

These revolve around the function essential for appealing to gamers and other enthusiasts: the inclusion of an AGP slot. While the case is large enough to accommodate a full length GeForce4 Ti 4600 card, and the necessary side ventilation holes are included to stop the card from being starved of air, Soltek has chosen to put the headers for the vast array of front ports on the edge of the motherboard between the AGP slot and side panel. This leads to a series of thick cables sitting jammed between the video card's heatsink and side panel. In other barebones systems, this is usually not a problem, as there are, at most, only one or two cables. But not with the QBic 3000M, resulting in obstruction of the heatsink by cabling.

Rather than a custom HSF for the CPU the QBic 3000M fits a standard Intel HSF, however this abuts the rear of the hard drive and necessitates very careful cable tying.

Soltek's QBic 3000M is a decent performing and sexy looking beast. Unfortunately it is let down by some basic flaws that scream inexperience and hamper users from getting the most out of the unit. It is a good start, but there is still a way to go before Soltek hits the same heights as other manufacturers' models.

Specifications:

i845GE chipset; Aluminium case; 200W PSU; AGP slot; PCI slot; two 5.25in drive bays.

Website: Soltek www.soltek.com.tw
Supplier: Altech www.altech.com.au
Phone: Altech (02) 9735 5655
Price: $770

7/10

Iomega HDD 80GB USB 2.0 external hard drive

As any file swapping fanatic will know, any hard drive can be a portable hard drive. Just unscrew the side of the case, unplug the drive from the IDE connectors, drop it in a static bag or other receptacle and get on your way. But this technique puts the drive in more danger of damage than normal, in which case a fancy hard-cased external drive becomes a tasty option.

We have seen IEEE 1394-based external hard drives for a couple of years now, but these are always hampered by the fact IEEE 1394 is still not incredibly common. USB 2.0 is a better alternative for removable storage for two major reasons: it is fast, and backwards compatible with the now ubiquitous USB 1.1 ports. USB 2.0 has also been a feature of all the latest chipset releases, and the majority of motherboards on the market now feature support for this high speed standard. The exception to this is that IEEE 1394 is better for recording digital video and the like due to its built-in support for isochronous data transport.

Iomega's 80GB USB 2.0 hard drive is a sleek little unit, much more portable than some of the paving brick-sized units on the market, but still very durable. Using a fast 7,200rpm HDD, rather than the 5,400rpm drives used on other types of external drives, the unit is capable of fast file transfer when hooked into a 480MB/s USB 2.0 connection – but the key is that unlike IEEE 1394, you can still get the job done with only a USB 1.1 connection. Unfortunately the drive needs a somewhat bulky power supply, but that will be a necessary evil until someone works out a funky way of connecting SATA drives externally.

The drive performs beautifully, with no drivers required for the simple plug and play operation. The big stumbling block is the price: for $629 you could get 200GB of fast storage using the IDE and static bag method of hard drive portability.

Specifications:

80GB 7,200rpm HDD; USB 2.0 connection; bundled with Norton Ghost 2003.

Website: Iomega www.iomega.com.au
Supplier: Iomega www.iomega.com.au
Phone: Iomega (02) 8875 7851
Price: $629

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RTFM

Bennett Ring wonders if many so-called 'intelligent' gamers are actually illiterate buffoons.

When a child is born into the world, the first thing it doesn't do is leap out of the doctor's hands and go play a game of cricket. It doesn't catch a cab down to the local supermarket to grab some extra comfy nappies and a bottle of that 'special' baby's formula, otherwise known as Tequila or liquid nappy remover, to liberally apply to the hot female babies in the nursery.

What it will do is lie on its back, occasionally pissing all over itself or its parents, and enjoy the occasional cry. For all intents and purposes, a baby is just a useless sack of meat, albeit a very cute sack of meat.

This is because humans aren't born with a built-in manual on how to live. Sure, our brain and nervous system automatically handle the important things such as breathing and sucking milk from a nipple, but that's it. Heck, it takes us several years to learn how to contract our sphincter to stop ourselves getting covered in our own excrement, and that's not exactly PhD material.

It actually takes about 15 or so years before we've learnt most of what we need to get by in this complicated world, although most mothers will say that their kids are still clueless at age 30. And that's just the basics of living. If you want to specialise in anything, be it karate, baseball or firing automatic weapons, such as Uzis, it takes years of learning and practice to do it well. And the better the instructions you're given in each skill, the better you'll be at it – provided you're not a clueless halfwit.

So, why the hell do so many gamers think they don't need to read the manual included with computer games? Playing a game is just like being born into a new world, with its own unique set of rules, complexities and controls. It's not as intuitive as the real world, as we rely upon a mouse and a keyboard to interact. So it's a very artificial way to do things when compared to the five senses we use in reality.

Nothing annoys me more than discussing a new game I've been playing with a group of gamers, and hearing about how half the guys didn't know you could straddle the pink dinosaur and traverse the vast landscape at hyper-speed, simply by pressing Ctrl+M. They wouldn't know this because they were too lazy to spend 15 minutes reading the manual or completing the in-game tutorials. As a result, they all moan about how long it took them to get to the magical demon-infested swamp cave, and proceed to mouth off about how crap the game is. Hello!? Am I the only one who sees the problem here?

Read the fricking manual folks! How can gamers expect to pick up a game and somehow know the hundred-and-one different controls and actions necessary to play the game the way the developers intended? Must be quite a few psychic gamers. . .

Developers have realised this problem, so many of today's titles include a tutorial to guide you through the game's basic mechanics. Therefore, after reading the manual, the first thing I do is complete the tutorials. By doing so, I know that I'll have a reasonably good grasp of what to do when the brown stuff starts flying.

Yet many gamers don't even bother to complete these tutorials, instead jumping straight into the action.

They then proceed to get the crap kicked out of them, and complain that the game is either too hard or not intuitive enough. Now I'm all for intuitive interfaces, but I also like my games to have a bit of depth. And the more complex our games become, the less likely it is that an intuitive interface is going to be enough to show us everything we need to survive longer than three nanoseconds.

Developers have also realised that many gamers have 'tutorialitis'. To get around this, they force the player to do the tutes by making the first couple of levels of the game the actual tutorial phase. This sounds like a great idea. . . until you go to start the game from scratch again and have to redo all of these tutorial levels.

They're usually very simple and usually boring to redo. The designers of Black & White figured out this was annoying players who wanted to start a new creature, so they included an option in a patch to allow the player to skip these introductory levels.

Unfortunately, not many other developers have done the same, so we're forced to plod through these basic levels thanks to those slack-arsed gamers who couldn't be bothered reading the manual.

The next time you get your hands on a game, make sure you read the manual! You're simply not going to get the most out of your game unless you do.

If you want your games to get deeper and more involved, you're going to have to accept that reading the manual is the only way you'll learn how to play the game properly. Hell, it can be an enjoyable read before you've fired up the game, as it helps to build the anticipation of all the cool things you're going to be able to do once you're playing it.

RTFM, and while you're at it you might also like to read the document called the *readme.txt* – there's a reason it's not called *dontreadme.txt* – do you read me?

artomic

Super Tart by Ron 'Dedman' Salter

'The image was first set up in Pose – the skin textures are a product of Deviant Designs (www.hextasy.com). Once the pose, clothes and textures were set up there, the file was taken to Cinema4D for some texture tweaking and final rendering. After that, some minor touch ups were done in good old Photoshop.

Please feel free to visit my gallery at 3D commune where I am a mod in the Poser forums.'

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Adobe

IGI 2: Covert Strike

There's no other Cold War hero like David Jones, even when Steve Polak is pulling the strings.

ABOVE: Although stealth is a critical element, a dynamic entry can be as good.

ABOVE: The AK47 flamethrower conversion disposes of crates in no time at all.

ABOVE: One of IGI 2's standout features are the lush and detailed environments.

In the original game the acronym IGI used to stand for I'm Going In, but in this sequel things are more sophisticated. IGI now stands for Institute for Geotactical Intelligence, and even though the new moniker is pompous rubbish, the game is a decidedly better effort in every other regard.

One thing hasn't changed in this latest incarnation: IGI is still all about taking on seemingly overwhelming numbers of enemies in hostile locations and somehow always coming up trumps.

You play as the ever-capable David Jones, and having successfully managed a retail empire for years you now decide to return to your true love, the life of a secret agent. Your mission is to investigate rumours the Russians are developing a new EMP weapon that has the potential to threaten the balance of power in the Cold War, a shadowy conflict that has flared up again in recent years.

So the game gets off to a flying start with you parachuting into Russian controlled territory to investigate a research facility. This mission is set at night and in some regards this is a dubious choice to start things off, as it is only in the light of day that you appreciate just how detailed and open some of the environments you visit are.

There are some good toys for you to use too. The binoculars are essential kit for when you are sussing out an area and getting a feel for it. They really help you spot enemy patrols and determine the safest way to sneak into a stronghold. The laser sight is another more high-tech gadget that you'll love for the heaven-sent havoc you can summon once you have locked on a target and called in the stealth bombers. There are also thermal goggles and a number of decent silenced and unsilenced weapons that for the most part are satisfying to use. Silenced weapons can be particularly useful, as stealth is often critical.

You might find the recoil from some of the machine guns a little off putting though as it does affect your aim a fair bit if you simply blaze away. Smart shooters will learn to use shorter and more accurate bursts. This is realistic even if some will find it less fun. The brilliant sniper rifle from the original game also makes a return.

If you have played the first IGI you will find there has been a subtle change in the AI, with enemies now being more capable of working together to triangulate, co-ordinating their efforts and looking to catch you in a cross fire. Still, sometimes your foes will just stand there and let you turn them into chunky Swiss cheese.

It is certainly a very welcome change that you can now save the game during missions, as this was an annoying element in the first game, transparent as an artificial way of making the original effort challenging. Indeed, Innerloop has wisely given you three saves per level, so you can't just keep creeping forward while saving – you'll have to use your saves judiciously. This way there is still the tension you get from knowing your saves are limited, but you don't have to restart every level just because you keep getting stuck at the end of a mission.

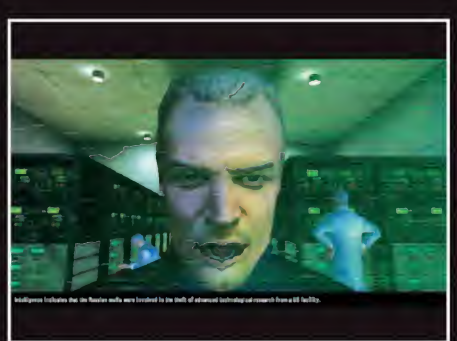
There are a number of different mission types too. Naturally there are challenging base infiltration missions where you have to use stealth and mighty good marksmanship to penetrate terrorist strongholds, but there are also towns, airbases, and caves to explore.

Not all stages are the same. For instance, one mission starts you aboard a helicopter, and requires you destroy AA sites so you can proceed on foot. For some perverse reason this mission doesn't let you save and it can be quite frustrating as the airborne bit is tough until you learn where the ground-based rockets are.

For the most part the new targeting reticule is a welcome change. Just like more serious combat simulations IGI now sports a movement-sensitive targeting system.

IGI2 is also now a multiplayer game, but it is really the engaging single player experience that makes this a solid improvement over the promising yet flawed original. This is the game 007: Agent Under Fire should have been.

7/10



GAME DETAILS

FOR: Good varied missions; and well-designed levels.

AGAINST: The helicopter stage is annoying; AI could still use improvement.

REQUIREMENTS: Pentium II 700MHz; 128MB RAM; and 1.9GB HDD space
RECOMMENDED: Pentium 4 1.4GHz
DEVELOPER: Innerloop www.innerloop.com
PUBLISHER: Codemasters www.codemasters.com
DISTRIBUTOR: GameNation www.gamenation.com.au
PHONE: GameNation 1902 262 626

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Freelancer

Between H-Fuel shipments to New Tokyo, John Gillooly stops to smell the laser fire.

ABOVE: Although you'll start out blowing up baddies, the dark side is never far away.

ABOVE: The variety and feel of each star system will have you jumping all the time.

ABOVE: The control interface is intutive, as well as refreshing.

There are few games in the Vapourware hall of fame, and over the past few years one of the shining lights has been Digital Anvil's Freelancer. After its first showing at E3 back in 1999 the hype began building about this spiritual successor to the much-revered Wing Commander: Privateer series. At that point it was being pushed as a massively multiplayer living universe, with 1,500 players on a server at any one time.

This multiplayer focus has been toned back somewhat, but in its place is an epic single player experience.

Freelancer takes place in a section of the galaxy that has been colonised by huge motherships that departed Earth to ensure the future of humanity after war brought the planet to its knees. These ships represented the major cultures of Earth, and this influences not only the political divides in the Freelancer universe, but also the distinct feel of the different systems through which your adventure takes you.

This back story sounds like the usual gaming plot that becomes irrelevant the moment you first open fire, but in the case of Freelancer this history permeates the entire game, driving the storyline as you journey through space trying to discover the reasons behind the destruction of the space station Freeport 7. You play Edison Trent, one of the few survivors of the attack, who begins the game broke and shipless on Planet Manhattan. To earn a few bucks you take on some work with the Liberty Police, which kicks off the storyline and soon has you frantically fighting your way through space, often against the odds in pursuit of the truth about a mysterious artefact that holds the key to the destruction of Freeport 7 and a much darker secret.

Interspersed with storyline missions are periods of free time, in which you must earn money in order to level up and keep the story pumping along. It is in these sections that the Privateer legacy kicks in. You can take on missions that usually involve patrolling sections of space for rebels or pirates, taking out their bases or capturing prisoners or stolen goods. You can also try your hand at trading goods between bases, or even a bit of piracy.

All of this occurs thanks to one of the prettiest game engines we have ever seen. Combining spangly lighting and weapon effects with varied and unique star systems, the game cranks out the eye candy seamlessly.

Exploration is a huge part of the game, adding depth and longevity. It is rare that you find yourself in unoccupied space: convoys travel past, police patrols check for contraband and battles rage between enemy forces. Once you leave the established trade lanes you never quite know what you will encounter, with mining ships dotted throughout gas clouds and asteroid fields, hidden jump holes to other systems, abandoned bases and other surprises.

This is only one of the ways in which Freelancer departs from the normal space combat sim, but perhaps the biggest way is in interface. Throw out your joystick and flex your mousing fingers, because Freelancer's controls are pure first person shooter. The mouse is used for twisting and turning your way through dogfights, the scroll wheel controls thrust and the WASD key combo is used for strafing and more dramatic engine control. This system is amazing, and allows for a hugely flexible control experience once you get comfortable with it. Rather than just dodging laser fire you can dash behind an asteroid, drop to a dead halt, and use you strafe keys to keep behind the asteroid as you wait for shields to recharge.

Surprisingly, the other game that springs to mind when crusing the galaxy is Diablo, which is the perfect example of an action RPG and has lent a lot of gameplay philosophies to Freelancer. Just like Diablo, there is a focus on using potions (in the guise of shield batteries and nanobots) for quick healing as well as unique items and weapons that reward exploration of the far edges of each star system.

Freelancer is a curious and unique mix of action game, RPG and more traditional space sim. Digital Anvil has combined these to produce one of the freshest PC games in years, an epic adventure that rewards magnificently for all those hours that you are sure to lose in the far flung corners of the galaxy.

9/10

GAME DETAILS

FOR: Enormous universe to explore; new and intuitive control system; eye candy.

AGAINST: Travel between bases and systems gets repetitive and time consuming.

REQUIREMENTS: 600MHz CPU; 128MB RAM; 16MB video card card
RECOMMENDED: 1GHz CPU; 256MB RAM; DX 8-compliant or above video card
DEVELOPER: Digital Anvil www.microsoft.com/games
PUBLISHER: Microsoft Games www.microsoft.com/games
DISTRIBUTOR: Microsoft Games www.microsoft.com/games
PHONE: Microsoft Games (02) 9870 2200

Praetorians

Steve Polak leads a Roman conquest of Gaul that is sadly, Asterix-free.

ABOVE: Your armies can grow fairly large, and in battle, they can be hard to control.

ABOVE: The single player game has you following the military exploits of the Romans.

ABOVE: 'I'm sorry, you've the wrong fort. The Gauls are over that bridge.'

Praetorians sees you controlling formations of troops as you wage war over some rather lavish 3D landscapes. The action is realtime and you can only spot the enemy troops that your men can see, so ambushes and hidden manoeuvres are very much part of the picture.

Formations are a critical element in this game, as they make units better at one function or another. These formations are easily selected by clicking on an icon on the interface, and the animations as your troops sort themselves out are really quite decent. The formations make a major difference during the fighting too. For example, your legionaries can move in tortoise formation, with their shields turning them into a living tank. This is great for moving while arrows rain down around you, but you cannot do much damage in combat in this mode, so you have to change formation type when you're close to the enemy.

You can end up in control of some quite massive armies as more troops are recruited by taking over settlements with your centurion and training up the locals.

There are various basic troop types, including spearmen, legionnaires, archers, cavalry, siege troops and light skirmishers.

This last group is also responsible for building strongholds, assembling siege equipment and shoring up settlements. There are also unique characters, like scouts, your physician and your centurion, each with unique functions. The scouts summon birds or dogs that then reveal hidden areas on the map; the physician heals your troops; and your centurion gives you a leadership bonus in battle.

Supporting characters like the physician and especially the scout can often move faster than the rest of your troops, and so they'll get ahead of your battle formations and be easily cut down by the enemy. Frustratingly, you have to continually keep moving them to the back of the formation or they get minced.

The landscapes are a delight to behold with their gentle flowing brooks and small furry animals wandering about.

Similarly the music is good melodramatic stuff, however the voiceovers aren't so hot. Unless you subscribe to the theory that Rome was built using cloned armies, it is a little hard to believe that all of the troops have exactly the same voice. This is sadly the case in Praetorians and for the sake of a few more speech samples the game would have had a lot more personality.

The action leading up to combat is exciting enough. You will be busy sorting out your formations and scouting the enemy position, but then once battle is joined it can quickly deteriorate into a seething mass of arms, legs, shields and weapons, and you'll find any options for tactical manoeuvring go out the window as numbers come into play.

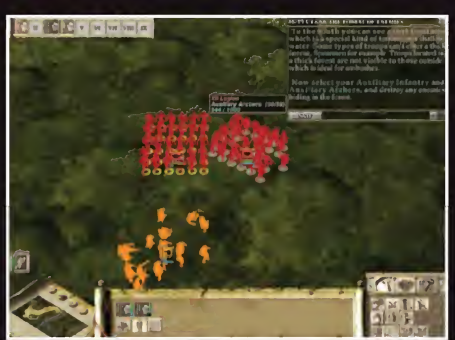
This is the game's Achilles heel. Sometimes you'll find it impossible to extricate your troops from a battle if they are losing, because you can't easily click on their icon and get them to retreat.

Praetorians has a very simple resource model. The more towns you take over, the more troops you can recruit. This works well enough as long as you ensure that the towns you have conquered are adequately guarded by troops you have left behind. In later missions the enemy is very adept at organising counter attacks in the rear of your position.

There are three factions you can control. The Roman army is the only choice for the single player game, but if you are interested in multiplayer or skirmish options then you can also lead the Egyptian or Gaul armies. The Gaul army has less rigid formations, but they are generally better at hit and run tactics, while the Egyptian soldiers are more like the Romans, although not quite as disciplined.

For the most part this is a tactical war game that delivers good accessible RTS action. If Pyro had only made it a little easier to control your troops both before battle and especially during the fracas, then this game would have been a lot more satisfying. That said, Praetorians is worth a look if you are a fan of the era and don't mind the loss of order which happens during the heat of battle.

7/10



GAME DETAILS

FOR: Good use of formations; and some good-looking landscapes.

AGAINST: Hard to control your men during battle; and speech is a little dull.

REQUIREMENTS: Pentium III 500MHz; 64MB RAM; and 500MB HDD space.
RECOMMENDED: Pentium III 733MHz
DEVELOPER: Pyro Studios www.pyrostudios.com
PUBLISHER: Eidos www.eidos.com
DISTRIBUTOR: GameNation www.gamenation.com.au
PHONE: GameNation 1800 060 605

Panzer Dragoon Orta

Would you like to Panzer some Dragoons with Bennett Ring? You really orta.

ABOVE: Orta is chock full of glitzy special FX, like the attack above.

ABOVE: One of the most attractive levels sees you flying through a massive canyon.

ABOVE: More of those effects. All hail the power of the Xbox's pixel shaders!

The original Panzer Dragoon was one of those games that snuck up quietly behind you grabbed you by the gonads and wouldn't let go until you'd experienced all it had to offer. While it didn't really do anything new as a game, being a simple rail-based shooter, its production values were stratospheric, and it was a game that was just plain fun. The sequel to this, Panzer Dragoon Zwei, also turned out to be a bit of a corker, so you can see why gamers are excited about the latest in the series, Panzer Dragoon Orta.

For those of you who missed out on the previous versions, here's a brief rundown of the gameplay mechanism. You fly on a whopping big mutant dragon, which automatically flies down a predetermined course. It appears that these massive winged reptiles have very small brains, and thus can only fly in one direction. A small amount of control over the dragon is allowed, enabling you to dodge missiles and veer off onto new paths that open up along the way. The cool thing is that enemies can approach from any direction, and you can rotate on your mount to cover your three, six and nine o'clock positions. A small radar lets you know when to start looking around. Sure, it's not rocket science, but blasting away hundreds of enemies per minute while swooping around on the back of a giant dragon is tres cool.

One of the biggest draw cards of the previous Panzer Dragoon games were visuals that put those found on bigger, badder platforms to shame. Well, they've done it again. Orta could well be one of the most attractive games ever made. Yes, that includes PC games. For starters, the dragon is both highly detailed and fluidly animated. You can almost feel the breeze from its swooshing wings. Place this dragon inside spectacular, massive and heavily animated levels, cram in hordes of highly detailed baddies, and you end up with a game that is nothing short of a visual orgasm.

Oh yeah, there are also some very cool special effects that make full use of the pixel shaders within the Xbox. Nice.

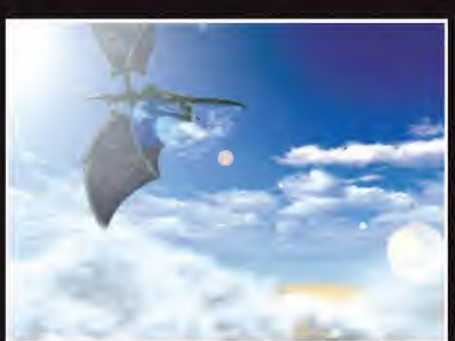
Sweet graphics aren't all that's needed to make a great game, so you'll be pleased to hear the gameplay within is just as tight. It's still the same rail-based shooter, but with a couple of tweaks that help avoid the dreaded boredom which sets in around the seventeenth time you try to complete a level.

While there are only ten levels within the game, each of these has many sub-routes that can be selected. Each level can have up to seven or eight other sub-routes, which is a good thing when you consider that the game can be completed in a few hours on the lowest two difficulty settings. Unfortunately these sub-routes still don't quite balance out the fact the game is very short, which is the largest, and perhaps only, complaint. After receiving a lot of flak regarding the length of the previous titles, you'd think the developer would focus on making this a lengthy game. . . apparently Sega didn't agree. One of the cooler features in Orta is the ability for your Dragoon to change form, of which there are three in total. The standard shape is the medium strength Dragoon – fairly manoeuvrable, armed with decent weaponry and able to take a bit of punishment. Next up is the uber-mega-bad-boy Dragoon, which flies like a sloth on tranquilisers but can both receive and deal the hurt better than any other form. Finally there is the wiener Dragoon, the most manoeuvrable but puniest of the lot. Choosing which form to take can make all the difference. Like the two preceding games, the production values within Orta are hard to fault.

An intriguing and unique storyline will captivate you to the point where you won't be satisfied until you've seen the final scene. Being a very Japanese game, it's a bizarre storyline, but not to the point where it will alienate Western gamers.

If it wasn't for the short length of the game, Orta could have been the perfect action shooter, with its great gameplay, stunning visuals and an enthralling storyline. While it's quite short, it is still an excellent title, but many gamers will find that when they've completed the storyline once, they probably won't touch it again.

8/10



GAME DETAILS

FOR: So much eye candy you'll probably get diabetes; simple yet fun gameplay; three Dragoon modes.

AGAINST: For the money, it's far too short. When will the Dragoon developers realise we don't like paying for games that can be completed in three or so hours?

DEVELOPER: Sega www.sega.com
PUBLISHER: Sega www.sega.com
DISTRIBUTOR: Infogrames www.gamenation.com.au
PHONE: Infogrames 1800 060 605

Vietcong

Smell of the jungle, or pungent punji pit? Logan Booker takes command of his team.

ABOVE: Ah. . . the rocks, the trees. . . and a punji pit. As we know, shit sticks in the hole.

ABOVE: Forest sounds; cut down by machine gun fire – just another day in 'Nam.

ABOVE: Many maps require slow advances as you clear areas of VC and disarm traps.

Nam. 1967. Gung-ho and oversexed Americans. LS3D engine. All the elements are there for a visceral and fresh first person shooter. Combine the tense environments of war-torn Vietnam with the tactical technicalities of guerrilla combat, and you have a winner. It could still end up reeking of rotting vegetation – and not in that realistic 'oh-God-I'm-back' sort of way.

Vietcong has you roaming the head of flashback nominee Steven R Hawkins, replacement sergeant for the 5th Special Forces group, situated at Nui Pek. A sweet intro introduces us to Steve flying in on a helicopter over rice paddies and forest ranges. At this point, we're also unfortunate enough to meet the weakness of the graphics engine.

While it's an eye-appealing game – especially if you have a video card that can handle 4x antialiasing while it's peppered with polygons – Vietcong suffers from some interesting problems not seen in recent titles.

Behind all the fog and mirrors is a modified version of Illusion Softworks' Mafia (LS3D) engine, called Ptero-II. Although view distances are very decent, South-East Asia has never looked so blocky. The game whacks into a low-lying branch when it comes to textures and geomorphic duties. Even with quality-enhancing effects such as anisotropic filtering, textures more than a few metres away from the view port take on a Doom-like appearance – pixelated and crap. You'll notice it more than a few times, but generally textures suit their environments. The engine also cops a stray 7.62 for rendering landmasses. Although the Ptero-II engine does a great job, one can't help but think that Unreal Warfare would've been a better candidate. Character faces and weapon models are nicely done though, as they appear to have had more attention paid to them texture-wise.

Game conversations are mostly entertaining: natives talk their country's tongue, and machine-gunners won't shut up. Although these asides can sometimes be over-the-top, mission briefings are well done and add to the atmosphere generated by other game elements. In-mission conversations, especially those between your radioman and HQ, are immensely beneficial to the feel.

Supplementing this is team control. While orders are limited to 'Get over here such and such,' and 'Stop,' having some sort of power over those around you does make a difference. You'll use your medic to keep alive, your machine-gunner to cover, and your radioman to call in artillery,

Single player consists of you and your team trudging through thick jungle, ace-ing VC and blowing stuff up. Vietcong excels in this regard, with intelligent enemy AI that will seek out natural cover. Rarely will an enemy have his head out for more than a few moments, just long enough to squeeze a few rounds from his AK47. Grenades quickly become a precious resource as you clear bunkers, hiding holes and the odd natural depression. Opponents and team members will yell and scream when they get hit, or need backup.

Effects, explosions in particular, aren't that inspiring. The aftermath and whistling (from both the incoming shells and the effects of nearby incendiary) are awesome though, and muzzle flares are nice and flamey.

Vietcong also features a 'no HUD' or 'Vietnam mode', where you've nothing but your iron sights and your head to keep track of damage, ammo counts and other assorted info. The game is played best in this mode, as it keeps you thinking, and adds to the game's realism factor. On the harder difficulties, it's especially good.

Multiplayer is unfortunately average. While there are heaps of modes, they are simple variations on common game types. The exception is the cooperative mode, but a lack of game settings limits this to a simple 'kill the VC' affair, rather than anything with substance.

Overall, it's an enthralling experience, and the game does well to preserve this feeling.

Although multiplayer ins't what it should be and the engine wasn't the best choice, Vietcong is an awesome play, and you'll enjoy lurching through the jungle screaming 'Charlie in the tree!' at every turn.

8/10

GAME DETAILS

FOR: Excellent single player; nice weapon models; great dialogs between character.

AGAINST: Landscape textures are blocky at a distance; disappointing cooperative mode.

REQUIREMENTS: 800MHz CPU; 128MB RAM; 32MB video card; 1.3GB HDD space.
RECOMMENDED: 1.5GHz CPU; 256MB; 64MB video card.
DEVELOPER: Illusion Softworks www.illusionsoftworks.com
PUBLISHER: Gathering Of Developers www.gatheringofdevelopers.com
DISTRIBUTOR: Take 2 Interactive Australia www.take2games.com
PHONE: Take 2 Interactive Australia (02) 9482 3455

Master of Orion III: The Fifth X

Steve Polak reckons the third version of this cosmic strategy game is a waste of space.

ABOVE: 'Green Bar, this is Yellow Hexagon. Merge into an undefined blob on my order.'

ABOVE: 'Interracial? Err. . . thank you for the complement. Now, about that planet. . .'

ABOVE: It's a 'Foreign' Office alright; only the natives know what the hell everything means.

Master of Orion III is the deep space equivalent of the seminal Civilization and the longest overdue sequel we can think of, but the question remains: now that it's actually here, is it any good?

Master Of Orion II was superb. The game saw you expanding your empire, reaching out into new star systems, developing technology and most importantly, being involved in bloody and apocalyptic wars. MOO2 delivered the sort of 'one more turn' gameplay which could keep you playing well into the night, and as such it is still better than many other contemporary space strategy games.

So what of the latest instalment? MOO3 is a game that has undergone a long, controversial and troubled development. Missing several deadlines and being hotly debated among the very strong and loyal Master of Orion fan base, this third instalment institutes a lot of changes. When you think about it this is no real surprise, as it is nearly a decade since the previous iteration in the series was released and as such you'd expect some serious changes.

Obvious superficial stuff like the visuals and audio are substantially improved when compared to the previous game, although it is also fair to say that as far as even a strategy game goes MOO3 is in many regards a fairly simple looking effort. There are some amusing incidental animations for each of the races you will meet, but a lot of what you will see is rather straightforward stuff. This is not the sort of game you are likely to load up to show off your latest 3D card to your mates.

However, strategy games often get by with marginal visuals, as long as the gameplay is sound. In fact, having played MOO2 as recently as a few months ago we have to report that the decade old classic was heaps of fun, even if it was so overpowered by the speed of a modern PC that the screen scrolled way too fast to be manageable.

There is a lot to look at and get a feel for in MOO3. There are many more menus and many aspects of the game have been fleshed out. However, in the process the game has gone from having an elegant to an awkward design. If you like simple logical strategy games that you ease yourself into then don't look here. Playing MOO3 is like studying to be an accountant, as there is a lot to remember and not all of it is obvious. Indeed, the game is hampered by ill-conceived pull down menus, which either don't seem to fit the screen or don't have consistent or logical exit screen tabs. This is poor, especially for a game where menu management is so critical.

Even though you can walk away from a lot of the micro-management and have it looked after by regional governors, you will be disappointed to find that your lackeys don't always follow your instructions or even general directions well.

You might ask your local managers to focus on science or developing a war fleet only to find that they are putting the local resources back into farming and by so doing impeding your grand strategic approach.

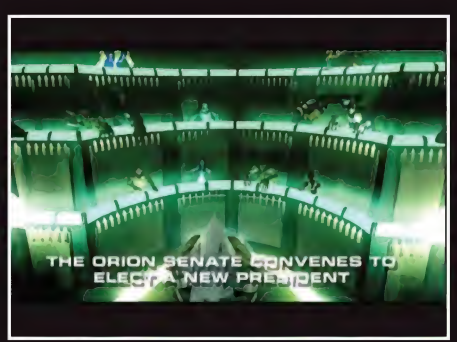
There are much more advanced diplomacy options and you can even engage in the process of political agitation, proposing a variety of bills in the Orion Senate. This would be a good thing were it not for the fact that the computer-controlled races act stupidly when it comes to the serious business of waging war, so you often simply don't need to manoeuvre politically – you can just roll your foes with your fleets of warships.

The combat is rubbish. There is nothing to do, not even when you take the most hands-on option. You just sit there watching the fleets collide and then rejoice if you win or have a sook if you lose.

On the positive side, the different races also bring unique personalities to the table, which with the new diplomacy model really add some character depth to your struggles.

However, as a workable cohesive game MOO3 fails to live up to its name, or even compete successfully with its contemporaries. The AI needs polish and the design just doesn't make the management enjoyable or compelling. With some serious patching the AI might be remedied, but the awkwardness of the game design is something set in stone.

5/10



GAME DETAILS

FOR: Plenty of depth for those prepared to delve; nice sound effects.
AGAINST: Abysmal interface; poor AI; unimpressive combat.

REQUIREMENTS: Pentium II 300MHz; 128MB RAM; and 800 MB HD
RECOMMENDED: Pentium III 733MHz
DEVELOPER: Quicksilver www.quicksilver.com
PUBLISHER: Infogrames www.infogrames.com
DISTRIBUTOR: Game Nation www.gamenation.com.au
PHONE: Game Nation 1800 060 605

IL2 Sturmovik: Forgotten Battles

Strap on your silly leather helmet and googly goggles with Bennett Ring.

ABOVE: An He-110 under heavy attack from multiple light sources.

ABOVE: Das dämpfen boot auf wasser. Ja. Aller dieser Mann wird bald sterben.

ABOVE: There's really only one appropriate word for the Me-262: 'schnell!'

Olex Maddox. Not only does this guy have a cool name, he's also the Russian aeronautical engineer behind the finest WWII flight simulation available: IL2 Sturmovik. Who'd have thought an engineer with zero game development experience could pump out a sim light years ahead of any similar product? Sim jockeys rejoice, because his best just got better with IL2 Sturmovik: Forgotten Battles, the official sequel to IL2.

The original broke the mould for WWII flight sim locales, based over the Russian front as opposed to the billion titles set over Germany and Britain. Forgotten Battles takes an even more obscure route, this time placing the battles in Hungary and Finland, which include more mountainous and coastal regions than the original. There are now four countries you can fight the good fight for: Russia, Germany, Hungary and Finland.

Over 80 flyable aircraft wait to be thrown around the skies, but this figure is based around 14 aircraft, with many variants of each. Notable newcomers to the series include the reliable Hurricane, the fragile Me-262A, as well as several bombers. Those of you who like to fly in straight lines, inviting enemy flak to rip you a new one before bombing some poor innocent factory worker into oblivion, are going to be more than happy with Forgotten Battle's implementation of bombers. The three bombers you'll be salivating over are the Ju-87 Stuka, with its sirens from hell, the nimble HE-111 and the archaic TB-3. As you'd expect, the targeting systems on these are 100% accurate to those used on the real-world aircraft, making hitting your target difficult – just how hardcore flight simmers want it. Rookie pilots will be grateful for the ability to tailor the flight engine to their level of expertise.

Forgotten Battles also introduces the Holy Grail of flight sims – dynamic campaigns. There is a massive range for every aircraft type at various periods throughout the war, so you'll never fly the same mission twice. These work well but lack an engrossing storyline. The nature of a linear campaign makes it easier to tell a story, while Forgotten Battle's dynamic campaigns feel like a string of sterile missions. This isn't so bad for pilots of a high enough rank, as you'll be trusted with squadron management, basically involving choosing which pilots to take with you to develop experience and skills, and which to leave at the base to enjoy tea and scones.

The original IL2 has the finest flight model ever seen in a WWII sim, and the sequel's is even better. The damage model has been tweaked to include up to 40 different damage zones on each aircraft, and it now seems a little easier to take bogies down. The graphics engine has also been touched up with new water and contrail effects, as well as gorgeous spotlight effects on night missions. The graphics didn't need much more work, as the original IL2 is still by far the best-looking flight sim. Today's gaming machines are two to three times faster than those the original IL2 players had to use, so Olex has increased the number of aircraft in each mission by a factor of at least three. It's not unusual to see sixteen allied aircraft going up against ten enemy aircraft, creating epic battles. You'll need at least a 2GHz+ beast to get the most out of IL2.

Multiplayer is as comprehensive as the original, with support for up to 32 players in co-op and head-to-head mode, and the Ubi Soft servers are already busy 24/7. You can have several people in one aircraft, allowing you to man the guns to do the fun shooty bits. The buggy sounds of the original have been fixed, and beg investment in a surround sound setup to get the most out of the audio.

The AI is mostly brilliant, but every now and then does something stupid. I'll never forget the time my seven Me-262 wingmen decided the best route to the target was to hoon along the grass at 100 miles an hour, instead of taking off. Knowing Olex's prior commitment to IL2, you can expect a fix for these AI glitches very soon.

IL2 was a groundbreaking game, and Forgotten Battles improves on this magical recipe. If you've ever wanted to live the daredevil life of a WWII pilot, it's the only game worthy of your attention.

9.5/10

GAME DETAILS

FOR: Great graphics and flight model; 80+ flyable aircraft; dynamic campaigns that work.
AGAINST: On rare occasions the AI screws the pooch big time – expect a patch soon.

REQUIRED: 700MHz+ CPU; 256MB RAM; DX8.1; 32MB DX8.1-compatible video card.
RECOMMENDED: 2.4GHz+ CPU; 512MB RAM; GeForce 4 Ti4200 or better; and SB Live! or better.
DEVELOPER: 1C:Maddox Games http://maddox.1c.ru
PUBLISHER: Ubi Soft www.ubi.com
DISTRIBUTOR: Ubi Soft www.ubi.com
PHONE: Ubi Soft (02) 8303 1800

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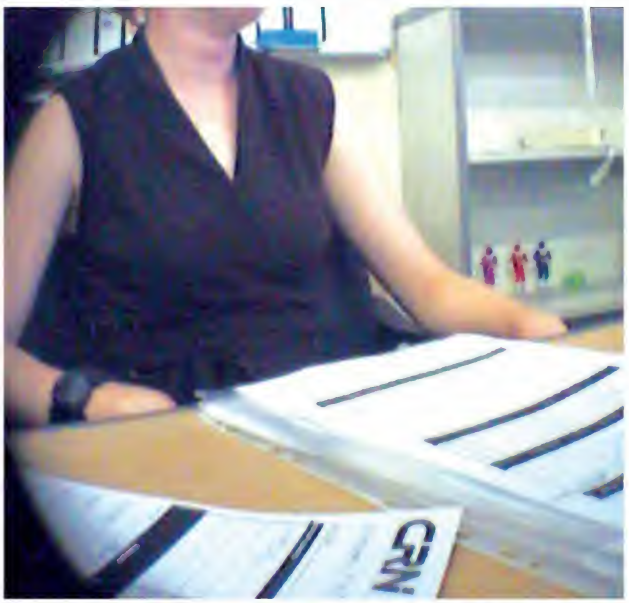

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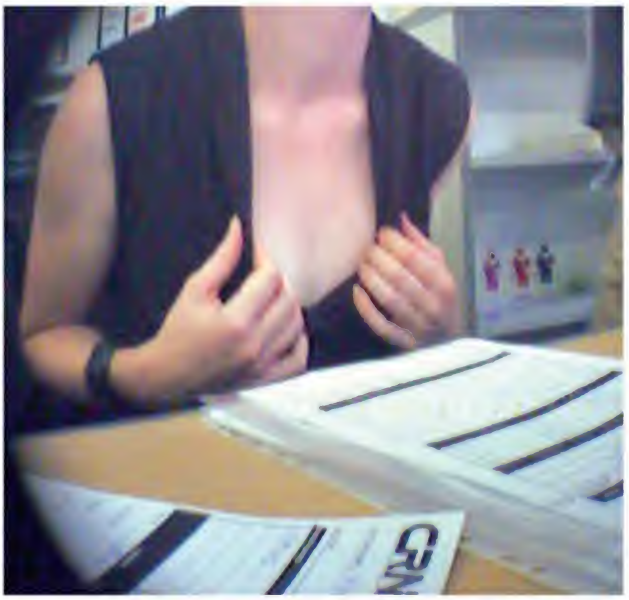

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CI/A28

Insidious occlusion

If *Atomic* was a mag about deep-sea diving (or escaping submarines) we'd have a tutorial on how you could build your own hyperbaric chamber. We're willing to bend backward every once in a while, but nitrogen poisoning isn't that fun. The Logitech MX500 is though, and IOOTM will get one of these optical delights. And now, back to Dan Rutter, our adventuring answers man.

IOOTM: Woozy gamer

I'm a typical gamer who really enjoys my gaming, however I get a massive headache (my friends call it motion sickness) after playing 15-30 minutes of games like Unreal Tournament 2003, Quake 3, Doom, or Jedi Outcast, which require 360 degree eye movement. However, when I play favourites such as Virtua Tennis, Dynamite Cop or any of the Street Fighter series, I can play for hours with no headache. Is there something wrong with me, and if there is, what can I do to fix it?
Stephen Quoy

You have 'simulator sickness', and it's quite common, though triggers and symptoms vary.
Basically, motion sickness of all kinds is caused by input to the brain that doesn't add up.
Usually, it's because your view of the world is changing orientation, but your inner ear and proprioceptive senses (the senses that inform you of where your body parts are) tell you you're not moving, or at least not moving in the same way as the view. The result is usually nausea, but headaches are quite common as well.
Simulator sickness, which some people called 'DOOM Induced Motion Sickness', or DIMS, when it first hit the news, usually comes from perceiving a moving world on your monitor, but not actually moving. A reasonable number of simulator sickness sufferers seem to have acquired it when they first started playing FPS games, then they got over it quickly. Some, like you, don't.
There are things you can try that may help. Basically, you want to give your brain visual stimuli that tell it you're not moving. If you play in a dark room, light it up; have plenty of obviously stationary visible stuff around the monitor. If you have a huge monitor and/or sit very close to the screen, move back, so the moving image takes up less of your field of view.
Here are a couple of papers on simulator sickness, in case you're interested:
www.hitl.washington.edu/scivw/kolasinski
www.stricom.army.mil/PRODUCTS/TDT/simsick.jsp

Chilly storage

I have been reading on the tech forums, and I have heard people say that if your HDD is dead, pop it in the freezer for half an hour and it should work for long enough to get your files off. Do you know how this works? I have tried it and it does work, but am puzzled about why.
Duncan Murray

Freezing isn't a miracle cure, but yes, it can bring some dead drives back for a brief period. Theories vary on why this works – differential contraction freeing up bearings, contracting platters increasing head clearance – but it indubitably, sometimes, does.

If you take an ice-cold drive out of the freezer, it'll shortly be covered, inside and out, with condensation. Water droplets on drive platters are a Bad Thing. To avoid this problem, you can try attaching power and data cables to the drive and then putting it in a zip-loc bag, sealing the opening as well as you can, so it doesn't have too much air from which water can condense. If you can manage it, you could also try running the power and data cables from the PC right into the freezer, and *running* the drive (which should at least be sitting on some newspaper or something, not on a bare ice-covered shelf. . .) while it's in there!

Mystery tasks

I am running Windows 2000 Pro. When I open Task Manager and check the 'Processes' tab, my computer is running 'svchost.exe' four times and it's taking up a lot of the RAM (about 20MB mem usage; I have 256MB of RAM). There is also 'vsmon.exe' running (I don't know what that is), and there's a 'GameChannel.exe' running when I'm not even running a game, and when I tell it to end process it closes everything. Please help.
Dean Giovannini

Svchost.exe is a generic name for Windows services that run from dynamic-link libraries. Multiple instances of it don't mean the same thing's running more than once.
Don't worry about these services eating lots of your RAM; if they're running but not doing anything, then most or all of their assigned memory will have been paged out. As for the other two – are you running the ZoneAlarm personal firewall? Vsmon is their 'True Vector Internet Monitor' program. GameChannel.exe is Wild Tangent's GameChannel, um, thing, which you may have got as part of a Logitech driver install. Assuming I'm thinking about the same version that you have, you should be able to right click the Wild Tangent icon in your System Tray, choose the About item, then click the Options tab, uncheck every box and click Apply and/or OK. Go to Control Panel, open the 'Wild Tangent Control Panel' item, uncheck the 'Automatic Updater Service Enabled' box and click OK .

Decorative metal

In my quest to pump out as much performance as possible from my system I have been looking at getting video RAM sinks, but remembered that the bible states they wouldn't do much, if anything (see *issue 23* and *issue 24* of *Atomic*).

Why is this so? Surely having RAM sinks sitting on my video memory with a case fan blowing a breeze over them from outside the box would help me push a few more cycles and put a bigger smile on my face. I am new to overclocking, but cannot see how this couldn't help. I understand it won't let my 9500 PRO outshine every other card on and off the market, but it should be able to make it a little better.

Brett McKenzie

RAM sinks *would* help, a bit. A very little bit. The clock speed ceiling difference is likely to only be a few per cent, and that'll barely even add up to anything measurable in any real world test. X percent more RAM speed does not give you X per cent more system speed.

Putting RAM sinks on video card memory is more sensible than putting them on system memory, because video RAM is clocked faster and runs hotter.

Even high-clocked video card RAM isn't at all likely to manage more than 10% higher clock speeds with heat sinks than it does without, though.

For reference, a quite pessimistic estimate of the heat output from the memory on an eight-DDR-RAM-chip, 128MB video card that's being heavily used is about seven watts. That's from all of the chips put together – each individual chip will be emitting less than a watt. Possibly a *lot* less.

Why do lots of video cards come with heat sinks on the RAM, then?

Well, a few percent is a few percent, and heat sinks allow the RAM a little more thermal leeway, so the card will be a little more stable at stock speed in a poorly-ventilated PC. The main reason for the RAM sinks, though, is just that they look cool.

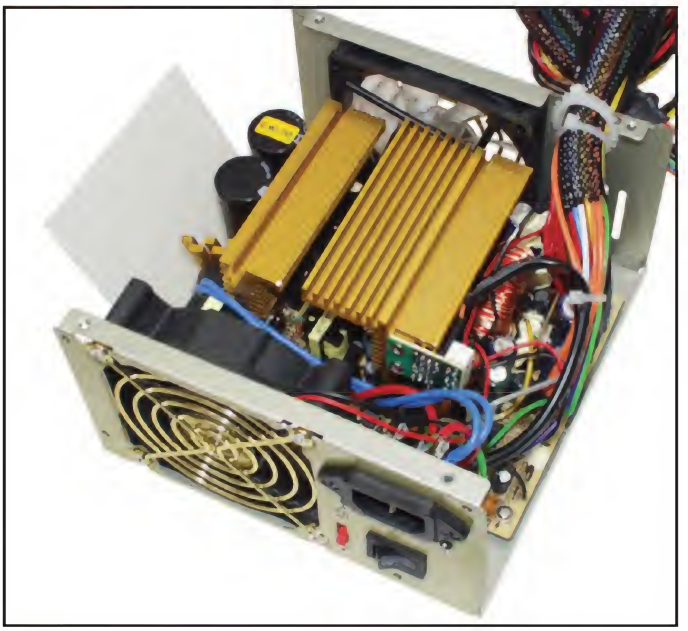
BELOW: RAM heatsinks may look great, but they don't do much.

Peltier power

I've been building a PC with a Peltier device cooling a water system for some time, and recently had to do some wondering. I was told that an 80-watt Peltier (around 6.6 amps at 12 volts) would run off the PSU, when I had installed a six amp transformer to drive it. The transformer I installed is about eight times the size of the one in the PSU, and even the wiring in the PSU doesn't seem able to handle six amps.

Although the PSU is rated at 300 watts, most of this is available to the 5V rail. Yet the PSU says that eight amps *is* available to the 12V rail. How can such high amperage be available from such a small transformer in the PSU, and will it run the Peltier device and the computer together?

Peter Harrie



ABOVE: You'll find a lot of components inside a PC PSU, but a big transformer won't be among them.

The two power supplies look so different because they work in quite different ways.

Your 'transformer' is, I presume, actually a linear power supply, which *contains* a big transformer, but also has a bridge rectifier, a smoothing capacitor or three and probably a voltage regulator as well.

Linear power supplies are simple and quite safe and don't emit any electromagnetic interference. But they're not very efficient, and they have to be big and heavy, because of that chunky transformer.

Your computer's PSU, on the other hand, is a switch-mode power supply, which is a lot more complex than the linear supply. Its little transformer is a very high frequency device, which is why it can be so much smaller, and the whole PSU is much more efficient than the linear supply. It produces some electromagnetic interference, but you can't have everything. By the way, the standard current rating for the 18AWG (American Wire Gauge) wire that most PSUs use for their drive power cables is nine amps.

If you had a very beefy PSU, then you could indeed run your Peltier from it; a 550-watt rated PSU, for instance, would probably be good for more than 20 amps on the 12V rail. Your current PSU isn't likely to be able to manage that sort of punishment though.

Xtra Peeved by Athlon XP

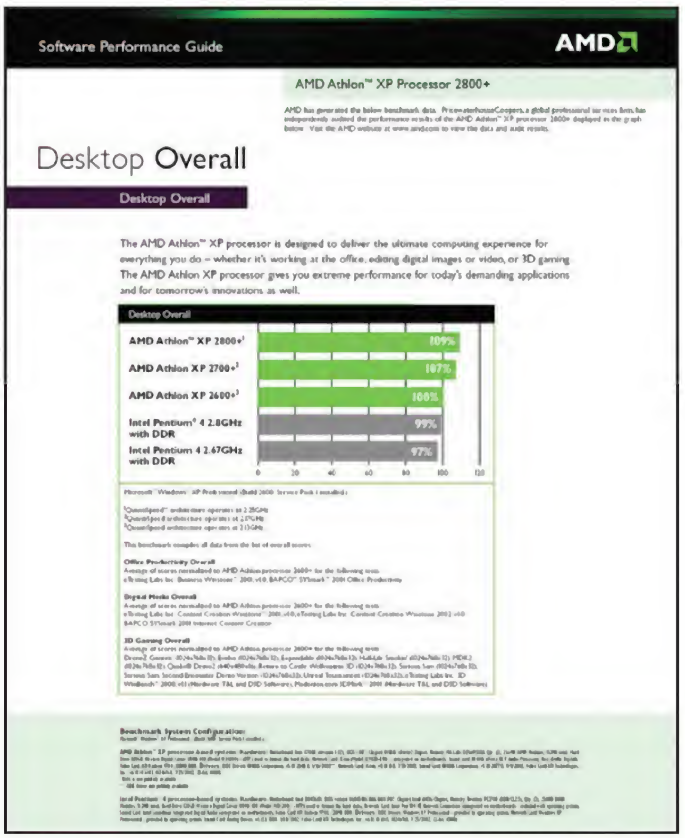
I'm not sure if you've covered this topic in a previous *Atomic*, but I'll ask anyway: what kinds of tests does AMD run in order to come up with its XP rating conventions?

I'm referring to the 'real world performance' in comparison to an Intel processor of a higher clock speed, for instance the 'Athlon XP 2600+', which runs at 2.13GHz.

I own an Athlon XP 2600+, and I find it consistently underperforms – although marginally – my friend's Intel 2.1GHz beast. Our machines are relatively similar (he built mine) so there shouldn't be too much variation on account of hardware specs. We run benchmark programs such as 3DMark, and the frame rate counters in games.

Is it legal, or ethical, for AMD to claim its processor can perform on par with a Intel 2.6GHz processor when it can barely match a 2.1GHz? If so, can I use these tests as evidence to get my money back on the processor?

Alex Wong



ABOVE: Amazingly enough, this collection of pretty graphs from AMD's marketing department *isn't* a bunch of nonsense.

Quick answer: No, the XP ratings aren't a rip-off. An Athlon XP with a rating that matches some given Pentium 4 processor won't beat it for everything, but it should beat it for most things, usually by a margin that's measurable but not particularly noticeable.

Long answer: AMD's Athlon XP performance rating numbers are supported by a suite of tests that's stayed the same since it released the original Athlon XPs.

That test suite used by Athlon isn't a particularly weird one: it basically includes a bunch of standard office, content creation and game benchmarks.

AMD also hasn't *just* been comparing the speed of its newest Athlon XPs to the speed of the first models and not to Pentium 4s, though that *is* what it has done many times. It'd be perfectly fine to do that if all the P4 lineup was doing was getting core speed increases, but the P4's had new core *designs* and a new bus speed to boost its performance a bit more. A 3.06GHz P4 is more than twice as fast as a 1.5GHz one.

The Athlon's had new cores and a new bus speed too, though, and it turns out that it's maintained parity.

All other things being equal, your XP 2600+ should be at least as fast as a 2.6GHz P4 machine.

All other things *can't* be equal, of course, as you can't run those two processors on the same motherboard. I can only presume that something else to do with your system – maybe hardware, maybe drivers – accounts for the difference between your system and your friend's.

Silent speed

I've been experimenting with overclocking my CPU (Pentium 4 2.4GHz), and I eventually figured out that to ensure stability, I had to change my PCI/AGP frequency to suit the CPU host frequency.

My default FSB is 133MHz, with the PCI/AGP freq at 33MHz/66MHz.

I've already determined what kind of frequency will allow my computer to start or not, and my mobo automatically resets the CMOS if it takes more than 20 seconds to load the Memory Test screen.

Anyway, the point is, I found out that at a FSB frequency of 148MHz, the PCI/AGP has to be at 37MHz/74MHz.

I set it like this via the BIOS interface, and when I started Windows, no sound played.

I tried playing some music in Winamp, and it came up with an error message saying that basically no sound card was detected in my system.

I re-installed the sound card drivers just to be sure, but to no avail. Why won't it detect the sound card, and is this problem fixable?

I mean, I'd like to have both a CPU speed of 2.66 GHz and also my MP3s.

Alex Moon

Presumably, the problem arose because you've wound the PCI bus speed up a bit, and the sound card doesn't work when it's clocked that high.

You don't mention what motherboard you have, but you seem to be saying that there's separate adjustment options for the CPU FSB and the PCI/AGP speed, but you're adjusting them as if they were locked together.

You really ought not to have to do that; the separate adjustment options specifically exist so that you can change the FSB *without* discombobulating the rest of your PC.

Anyway, assuming you do need to use the higher PCI/AGP speed, then if your sound card's an actual separate card (not built into the motherboard), installing it in a different slot *might* help, but probably won't.

Changing to another sound card might solve the problem, too, but there's no guarantee the new card would like the elevated bus speed any more than the old one did.

You've only overclocked your CPU by eleven percent, here, anyway, so that's not going to give you much of a performance difference. Sure, it's 266-odd megahertz more, but that isn't that much when you're starting from 2,400MHz.

So if you have to go back most or all of the way to stock speed, you won't actually be losing much.

GET YOUR TWEEX ON

It's all about spinning nipple nuts. There's a fine technique to the Theory of Tweakage, and as you know, the best breast wart twisters in the whole galactic galaxy are Atomicans. So, send your highly classified PC tips to phr33xtw33x@atomicmpc.com.au. We also accept schematics for time machines.

TweakOring your Windows Security – part 1

Windows 2000 and XP, in their default states, are not terribly secure. There are a bunch of things wannabe hackers can do to access your precious movies, pics and other stuff you would rather keep hidden, particularly at the leech fests that are often called LANs.

Here are a number of tweaks and adjustments you can perform to lock down your system from all but the most gifted hackers. Many of these require that you use NTFS partitions, instead of FAT32, as NTFS provides controls and security features that are not available with FAT32.

If not authenticated to a domain, Windows XP Professional uses 'simple file sharing'. This means that network requests that rely on RPC (Remote Procedure Call), such as file and print access, remote registry access and remote management, can all take place through the Guest account. As such, Microsoft would rather you didn't disable it, even though that account, combined with 'simple file sharing' is a security risk.

Just disabling the Guest account is no good, as simple file sharing explicitly depends on that account. Without it, you will run into some serious network problems. So we need to tell Windows not to use 'simple file sharing' at all, and instead, force all network requests through authenticated user accounts. Do this by going to the 'Tools' menu in Windows Explorer and selecting 'Folder Options', then 'View' and 'Advanced Settings' then clear the tick box for 'Simple File Sharing'. Simple, hey?

Just removing it from the 'User Accounts' folder in Control Panel only removes it from the login page, but leaves it available for network shares. So if you decide you want to disable it properly, you should do it under Control Panel -> Administrative Tools -> Computer Management in the Users folder, under Local Users and Groups. Double click on the Guest object and check the box to disable it.

The Administrator account is an obvious target for hackers. With Administrator privileges, they have full access to anything they want and can do anything they please. As the account name is already known, it's just a matter of finding the password. You can make life miserable for hackers by either just renaming the Administrator account to something only you will remember, or better still, piss them off completely and create a dummy Administrator account, then give it no privileges. Oh, enable auditing, so you can see what the buggers are up to.

Be careful though. Before you take administrator rights away from the Administrator account, make sure you assign such a role to another account, or you will be scratching for that Windows installation CD. It's easy to lock yourself out of your system.

The NET SHARE command, entered from a command prompt, will show you all of your shared folders. 'But I dun have any folders shared' you cry. Wrong. Windows 2000 and XP create a couple of administrative shares for various default user groups. These shares are generally named C$, D$, E$ (depending on your various drive assignments) etc. for Administrators, Backup Operators, and so on. There is also ADMIN$, which is used during remote administration and usually the 'Windows' or 'WINNT' folders. Also, you will probably find IPC$, FAX$ and NetLogon. Others can misuse these shares, so you might want to disable them. Do this in the registry at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LanManServer\Parameters. For Windows 2000 Professional or XP Home/Professional, give the AutoShareWks a REG_DWORD value of 0. If you are running Windows 2000 Server, then set the value for AutoShareServer to 0.

You may discover that some applications depend on these shares. If you experience problems, they'll need changing back.

Microsoft, in its wisdom, turns on a number of services by default. Some of the services have the potential to make your PC an easy target for l337 haXOr's. If you don't actually use the following, turn them off:

- Netmeeting Remote Desktop Sharing;
- Remote Desktop Help Session Manager;
- Remote Registry;
- Routing and Remote Access;
- SSDP Discovery Service;
- Universal Plug and Play Host; and
- Telnet

All of the above open handy little doors into your system for possible misuse. This list also includes IIS, although it isn't installed by default. Unless you specifically need IIS, don't install it.

For Registry nOObs

The Registry is basically a database which Windows relies on for all its settings and information on your software, hardware and system preferences.

Remember to treat the registry with respect. It is very easy to render your system inoperable if you mess around with settings you are unsure of. If you haven't ventured in there before, don't be scared – go and have a peek, but don't delete bits that look like they don't mean anything, or change anything you aren't familiar with. Go to Start -> Run and type 'regedit' into the dialog box, and browse away. You can't hurt it just by looking at it. If you want to become intimate with your registry, have a look at www.winguides.com/registry for a huge range of registry hacks, as well as a registry tutorial.

It is advised that before you make any changes you export any keys you edit to a file by right clicking on the key and selecting Export. At least then if your tweaking goes awry, you have a chance to restore things to their pre-fiddled state.

Embrace de bug

Keep the hugs in reserve for your granny, as we're referring to the sort of embracing a grizzly bear dispenses on hunters who can't climb trees. So why the fox hat on your head? Get your act together and join Peter Sbarski on his debugging antics – it's a hell of a lot more fun than debearing.

Old school hackers should still remember a small program called 'debug.exe', back when DOS (debug was originally introduced with DOS 2.0) hacking was cool. These days this tiny versatile utility isn't used so much, but this doesn't mean it's obsolete. Actually, it is very useful for a couple of tasks.

For those not familiar with debug, it's an MS-DOS command that can be used to create assembly programs, interface with memory, and directly communicate with hardware. It's powerful because it allows you to go beyond simple DOS and Windows shells and really create havoc (especially when paired with SoftICE).

This tutorial is stacked (excuse the pun) with tips and tricks you can do with debug. You should be warned that incorrectly using this utility can cause irreversible damage to your data and hardware (there is no undo function). Please take caution with you in a little knapsack, instead of tossing it into a gale. And always check everything twice. We can't be held responsible for any damage you might cause your computer while using this information.

A tutorial of quickness

You can run debug from 'real' DOS (F8 during boot in a Windows 9x environment) or a DOS prompt in Windows (for us poor saps using a 2000-based OS) by typing 'debug' and hitting Enter. Debug commands and programs that only deal with reading memory can safely be run from a DOS prompt in Windows. The worst you'll see is a memory error. However, if you need to write to memory or modify hardware, you should boot into real-mode DOS, preferably with a boot disk. You can make a suitable boot disk in Windows 9x/Millennium under Add/Remove Programs. The file 'debug.exe' will be included automatically. You can also make a boot disk in Windows XP (in My Computer, right click on the floppy icon, choose 'Format' and select 'Create an MS-DOS startup disk'). If you have to go the XP way, you'll need to find and copy 'debug.exe' to that disk yourself (hint: try Google). Windows XP and 2000 comes with a 'debug.exe' that you can run in a DOS prompt under Windows XP/2K, but it won't work if you copy it to a boot disk and try to use it in real-mode DOS. You can also try to find a suitable boot disk image on the Net.

When you enter debug, a small dash will appear to the left (it should replace the command prompt). From here you can type a command and press Enter to execute it. To exit from debug, just type 'q' on a new line and hit Enter.

Now to show some fun things we can do with debug. . .

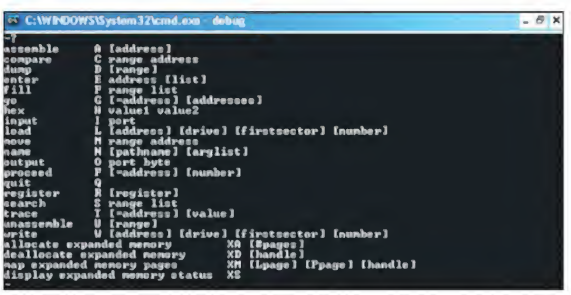
What's your graphics card?

I once had to reformat and reinstall Windows for a semi-computer-literate friend who had no idea which graphics card he had. He'd lost all the manuals and CDs a long time ago and I could see the potential for time wasting if I had to climb under his desk, open the computer case and check out the graphics card. However it then hit me that I could use debug to look up his graphics card and be done with it.

Anyway, in case you end up in the same situation as me, here's what you can do. Fire up debug and type:

-d c000:0100 <Enter> *or*
-d c000:0090 <Enter> *or*
-d c000:0010 <Enter> *or*
-d c000:0040 <Enter>
-q <Enter>

The command 'd', as you've probably already guessed, tells debug to display (or dump) the contents of the memory address that proceeds the letter. Depending on the graphics card and the age of the motherboard any of the above four lines may work.



ABOVE: Information about your PC is a key stroke away.

Forgetting and retrieving BIOS passwords

Forgetting a password is annoying. Forgetting a BIOS password that you just set up the other day to prevent your meddling friend from changing CAS values can border on insanity-inducing.

Avoid the need to short pins or remove a battery with this little trick.

Run debug from real-mode DOS (ie. you'll need to start the computer with a boot disk) and enter the following commands:

-o 70 2e <Enter> ('o' tells debug to output a byte of data to a specified port)
-o 71 ff <Enter>
-q <Enter>

Reboot the computer and try to access the BIOS. The password prompt should be no more and all your settings should also be erased. If you get a checksum error, don't worry about it, and just continue. If this trick doesn't work (and it may not on certain motherboard models, especially the newer ones) try the following tip:

computerhome.com suggests this other way of clearing the password. This will also reset all BIOS settings. In debug enter the following:

-a <enter> ('a' forces debug to assemble

8088/86 mnemonics into memory)

mov AX,0 <Enter>
mov AX,CX <Enter>
out 70,AL <Enter>
mov AX,0 <Enter>
out 71,AL <Enter>
inc CX <Enter>
cmp CX,100 <Enter>
jb 103 <Enter>
int 20 <Enter>
<Enter>

-g <Enter> ('g' executes the lines of code you typed above)

-q <Enter>

If you want more information on the above code visit: www.computerhome.com/rdebug.htm

I must admit that I've only tried these two tips myself on a couple of motherboards equipped with AWARD BIOSes, and they worked fine. I advise you to exercise extreme caution when dealing with these – make sure you type the commands and code correctly.

ABOVE: If you change contents of the file via debug no one will ever be able to recover the original data.

Date revealing

OK, this is probably a useless tip but it shows some of the power of debug. You can check the date when the BIOS, and the motherboard for that fact, were manufactured. Fire up debug and enter:

-d FFFF: 5 L 8 <Enter>
-q <Enter>

Partition deletion

If you have a partition you can't delete in FDISK, debug can help you out. It's especially useful if you have an NTFS or a strange non-DOS partition present on your system. Just be very careful with this – it will erase *all* your partitions and you will lose everything. You should only use this method as a last resort.

In debug type the following:

-F 200 L1000 0 <Enter>
-A CS:100 <Enter>
mov AX, 301 <Enter>
mov BX, 200 <Enter>
mov CX, 1 <Enter>
mov DX, 80 <Enter> (type 80 for hard disk 0, 81 for hard disk 1, etc.)
int 13 <Enter>
int 20 <Enter>
<Enter>
-g <Enter>
-q <Enter>

Reboot and run FDISK again – your hard drive should be clean. All you need to do is create a new partition and then format it.

Here's another way of doing it:
www.winntmag.com/Articles/Index.cfm?ArticleID=5327

It's also possible to do a low level format via debug. If you need information on how to do it check out the links at the end of this article. Just be very careful with low level format, because it was taken out of the BIOS years ago for a reason.

Using debug as a hex editor

Debug can be used as a hex viewer and a rudimentary hex editor. Those familiar with hex editors will find debug very easy-to-use. Those who aren't will require a little practice, however, I suggest you find a dedicated guide on hex editing and read it first.

Here's just a short overview on some of the basic hex functions you can use in debug:

- To open a file in hex mode type: **debug 'filename'**, eg. '**debug autoexec.bat**'.
- To view a dump of a file and the appropriate memory locations type '**d**'. If you keep hitting '**d**' and **Enter** debug will display further portions of the file.
- To enter data into a memory location press '**e**' and then enter the segment and the offset found on the left-hand side (or you can just type in the offset), for example:

-e 0AF7:0100 <Enter> or
-e 0100 <Enter>

After you enter the memory location, debug will display the first hex value in that memory address.

Type in your own hexadecimal value and then press Space to go onto the next hex value. Or hit Enter to finish.

- You can also enter data in ASCII format.

If you want to modify a file which contains the string '**best mag**' to string '**atomic**' located at offset 0100 type:

-e 0100 "atomic " <enter>

It's important you add the whitespace so that the string sizes match. In this case, '**best mag**' is eight characters, and '**atomic**' is six, so '**atomic**' needs three extra spaces.

To write changes to the file press '**w**' and hit **Enter**.

There are a lot more things you can do with debug.

Have a look at www.datainstitute.com/debug1.htm for an excellent debug/assembly tutorial.

One more tip: if you want immediate hex access to any file, add a shortcut, which points to 'debug.exe', in your Send To folder.

Then all you need to do is right click on the file, select Send To and then debug. Easy.

And remember: double check everything.

Is this it?

Not at all – we've only scratched the surface!

Debug is mightily powerful and it would take a couple of thick volumes to cover everything. If you want to find out more about debug try the following links:

www.datainstitute.com/debug1.htm
www.computerhope.com/rdebug.htm
www.uktsupport.co.uk/reference/debug.htm
http://personal-computer-tutor.com/abc2/v8/vic8.htm
www.comptechs.org/hardware/debug.htm
www.psyklone.com/debug.html

Mark's Aural Decipher: the thrilling conclusion

Aurally inclined? Or do you just like Mark White? At *Atomic*, we all went nuts with the first tutorial – mind you, we didn't do anything to Mark. You know, the police and all that. So, avoid an AVO and just do the tutorial. We'll like you, and so will Mark. Doubtless, the end result will be endearing.

Looks are everything.

You can't avoid it; this tiny fact applies to the case you're to house your MP3 box in. If it's shabby, then people are going say 'What the heck is that ugly box in the corner?'

Ooze in some style, a bit of class, and some plain old ingenuity, and be prepared for 'You made that. . . wow! Now do one for me, ya mug.' There are plenty of ways you can go about the design, manufacture and construction of your MP3 box's case – it really all depends on what tools you have access to and how confident you are.

In this tutorial, I'll outline how I went about building my case. Now, a few of the things I did may be a challenge for some, but hopefully it will generate ideas or, at least, provide a starting point.

The keys to construction are accuracy, good design and determination. Your first attempt might not be as successful as you'd planned, but it can always act as a prototype you can build upon.

While creating the Aural Decipher, I endured many trials, errors, and downright silly mistakes before it was completed. Even now I still think it needs work and refinement. I know building a case from scratch isn't the easiest of tasks, but you're probably aware of this. It's an especially tricky task if you've never done it before – but you should give it a go.

We're Atomicans, and that's what we do.

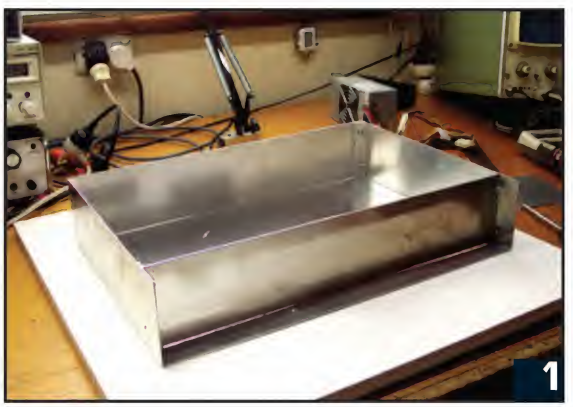
The chass-meister

The fundamental design of the chassis will inevitably affect the overall look of the MP3 box – so it is best to outline exactly how you'll build it. For example, make a list of the tools and materials you have access to and anticipate any problems. I designed the Aural Decipher's case with the mindset that a standard Hi-Fi-looking case was the easiest to build, and Aluminium was the easiest material to work with (mainly because I could cut it using a drop saw and bend it without trouble).

When you are designing the chassis you'll have to take into account where and how you will be mounting the power supply, motherboard, hard drive, display, buttons etc. The power supply, motherboard and hard drive are all fairly simple and don't need much planning, but the way you attach the buttons, display and CD-ROM to the case will require a fair amount of thought (well if you want to make it look as professional as possible), as they are easily visible components.

The Aural Decipher's chassis comprises of one sheet of 0.8mm aluminium, bent (using a home made sheet bender) into a 'u' shape to form the base and two 3mm aluminium panels (false and back) which are secured to the base using six aluminium 'L' brackets and screws.

In Diagram 1 you can see the assembled chassis minus the holes for the power supply and



1

CD-ROM drive do. There's not much to it, as long as you bend the base accurately.

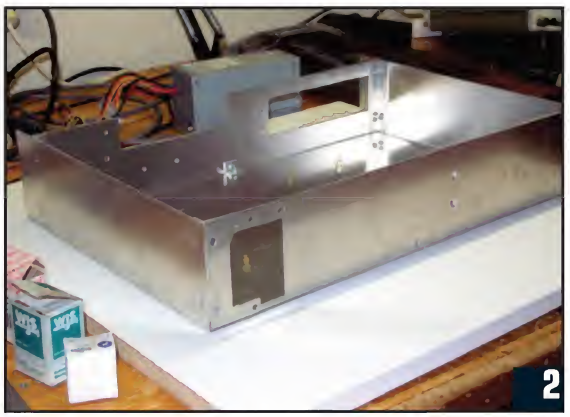
You can't see the last two 'L' brackets as I was still deciding whether I needed them.

In the final case, the brackets were secured in the middle of each panel and then to the base (including the front panel).

Panel impostor

You will find in almost all commercial equipment that there is some kind of false panel to secure circuit boards, displays and other components that are a part of the equipment's front panel assembly.

I adopted this same technique; securing the uC-Board, display and buttons to the Aural Decipher's false panel, removing the need to fasten any components to the front panel. Visible screw holes around the display and buttons? I think not! The false panel in the Aural Decipher



also adds structural integrity (reducing sidewards flexing) and allows the securing of a crossbar to which the CD-ROM drive is attached.

The next stage of the case manufacturing: the CD-ROM and power supply holes have been cut using a jigsaw and file – before the CNC milling machine was completed – and most of the securing holes have been drilled.

Buttons!

In most home-made cases (for electronic projects) I have seen, the buttons always seem tacky, or look like they've been stolen off the original Starship Enterprise. When I was planning the Aural Decipher case, I wasn't going to settle for this. So with some prototyping I found a way of easily manufacturing buttons and securing them.

A long tube of solid Aluminium provided the main material for the buttons. This tube is cut into small segments and through the use of a mini-lathe, the segments are crafted to the right size, cleaned up, and a hole drilled halfway through the centre. Another hole is drilled perpendicular to the centre hole and then tapped so grub screws can be put in either side. The grub screws are used to secure the button to a micro-tactile switch with a shaft that is slightly longer than default (you can by them from JAYCAR cat# SP-0603).

The tensile strength of the button is all that is needed to spring the button back when pressed. The micro switch is soldered to the uC-Board, and lastly, to preserve the metallic shine of the buttons, I used a clear touch-up spray paint for cars (from Super Cheap Auto – PowerPlus brand), which sets hard and gives a shiny appearance – simple enough? Diagram 2 shows the design of the buttons. Not everyone has access to a lathe, or all the tools necessary to make buttons similar to the ones in the Aural Decipher, so you can buy buttons (probably not Aluminium) and their switches from JAYCAR, Dick Smith or one of the other electronic suppliers mentioned in the last tutorial. I manufactured my own as it was cheaper and I had control over the button diameter.

Personalised PCBs

Last month's tutorial mentioned how you could go about redesigning the uC-Board. I highly recommend you design the uC-Board specifically to your case. If you made the one from the last tutorial, consider it a prototype. At least you know the software works. The new design of the uC-Board should complement the design of the front panel and false panel. This should simplify fiddly alignment issues, the positioning of the buttons and VFD/LCD, and also improve the general neatness of the case.

For instance, the uC-Board used in the Aural Decipher includes all the buttons (minus the power button) and VFD on the one board – reducing unnecessary cabling and making it easier to fit the front panel.

To successfully redesign the uC-Board, you have to think about how the front panel, uC-Board and false panel all fit together. It is best to design them all at once with an overlay approach, considering that they all interact. If you forget one then you could be up for a rough time later on, and make more work for yourself. Also a good idea is the use of long screws that go straight through the false panel and uC-board to connect to the front panel, making alignment as easy as possible, though this is up to you.

Panel, eyes front!

The front panel is what will make your MP3 box sleek n' stylish; or whatever look you're after. It can also can go the other way and make the MP3 box really shabby, so pay extra attention to the aesthetic. But do remember that you have to *use* the front panel, so functionality is most important.

The first prototype of securing the buttons to a front panel. The buttons aren't the ones I manufactured for the Aural Decipher, but they show how they're secured.

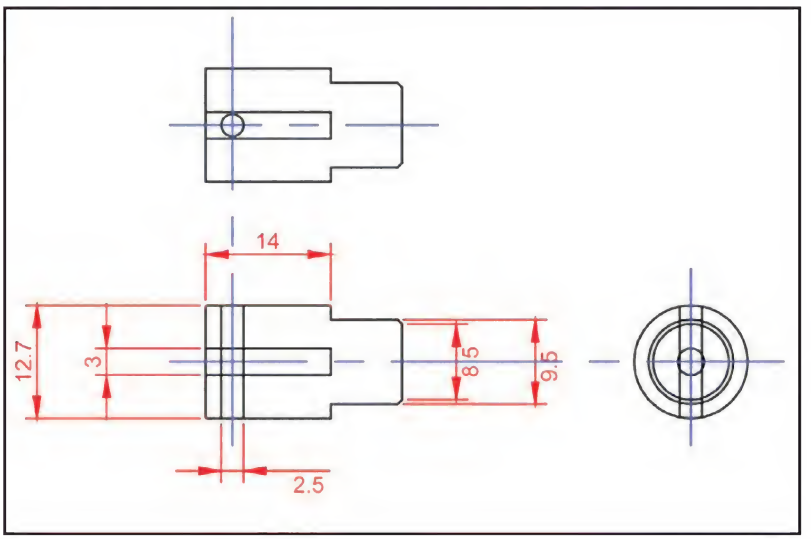
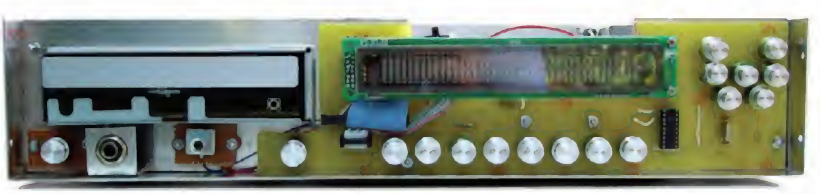


Diagram 2: The design of the small buttons that are seen on the Aural Decipher.

The front of the Aural Decipher, minus the front panel. You can see the uC-Board with all the buttons and VFD connected to it directly.



Some people aren't fans of the design of my front panel, but for me it is easy-to-use, functional, and fitted everything!

The menu buttons at the right hand side are used for navigating the menus and hence have to be grouped in a logical fashion (though kinda weird-looking) and the rest of the buttons are all in a line, which is seen on a few Hi-Fi CD players.

In the Aural Decipher the front panel, uC-Board and false panel all interconnect. The only way I could achieve accuracy between the different levels was by using a CNC milling machine to make the display and CD-ROM slots, and drill the centre holes for the button locations (I then used a normal drill press to drill the button holes to the right size). Now this is where most people are going to say 'What! A CNC milling machine. . . yep, everyone has one of them lying around. . .'

True, they're not the most common things around, but if you can find someone that has one, you won't be disappointed by what you can achieve. A small warning though: it can take a little more work to generate the G-Code and use the CNC machine because of the learning curve involved.

If you can't get access to a CNC milling machine, you can always try the manual method of using a Dremel, but it could be tedious trying to accurately cut the holes. Tedious, but possible.

A common question I've been asked is 'How did you secure that Perspex window in front of the display?' My answer? Through the wonders of a milling machine.

The hole in the Aluminium for the window, and the Perspex window itself, are both milled to fit perfectly – and that's exactly what happened. The window isn't glued in, just pressed in. I also left an overlap area on one side of the Perspex window, so it can only be pushed in so far. You can try using epoxy glue and a router to achieve something that looks similar if you're doing it manually.

Down by the CNC mill

Who has a few thousand dollars to spend on a CNC milling machine? Not many. . . especially if you only need it for one project.

This is when you start flipping through the phone book and search for a company that provides this service (or finding another method).

They are around, but do cost quite a few pennies depending on what needs to be milled. Fortunately there is another option.

Do you have old printers, stepper motors, gears and general electronic components lying around?

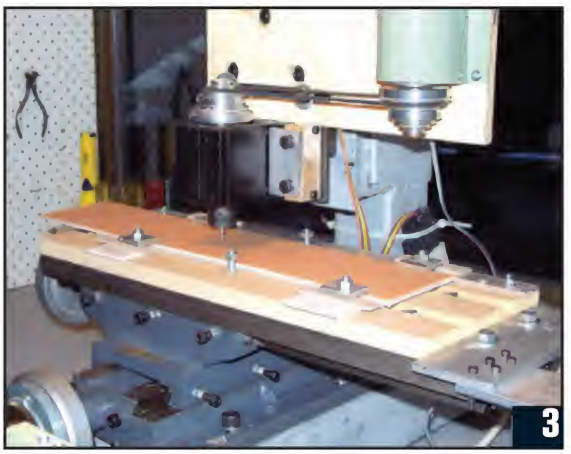
If you do then you could possibly build a CNC milling machine cheaply.

That's exactly what my father and I did.

It can be done, but is rather difficult and beyond the scope of this tutorial. Worth mentioning is a program called Enhanced Machine Controller (EMC). This software has the ability to control many different types of CNC machines.

What I like most about it is it runs under Linux, is completely free, and actually works well (it accepts G-Codes). So if you do attempt to build a CNC milling machine, check out EMC.

The finished front panel in all its glory. In this photo you can see the DECAdry letters used for labelling. Also of note is the darkness of the Perspex window, which was achieved by blocking out the areas of the display that aren't used with a transparency sheet made by a laser printer.



Here's the home made CNC milling machine – the device used to mill the front panel.

Polish my panel

Anodising is the most common way of sealing Aluminium for front panels and other instruments, but that wasn't the look I was after for the Aural Decipher. I experimented and eventually achieved a look that was pleasing and suited the box. It is a fairly simple process, as outlined below:

1. Using an orbital sander with wet and dry sandpaper, go through the grades from fairly low (100) to high (2,000), until you have a smooth uniform finish across the front panel.
2. Grab a bottle of Brasso and shine it up to a mirror finish (so that there are no scratches).
3. Now this next step may seem a step backwards, but it isn't. Using Ajax, lightly scrub the polished front panel in a uniform back and forwards motion.
4. Submerge the front panel in a moderate concentration of NaOH (caustic soda – experiment with different concentrations on scrap until happy with results) until a matte white film appears.
5. Let the front panel dry, making sure that you don't wipe where the white film is (it is relatively resilient, but can be smudged).
6. Spray on an even coat of clear touch-up spray paint for cars.

For a professional this maybe a stupid way of finishing up the front panel, but it worked for me and I was happy with the end result.

Panel attachment

This was one of the trickiest parts of Aural Decipher. The first challenge was finding the right way of attaching the front panel without bolts/screws being visible. And the second challenge was that when I did come up with the method of attachment I discovered that if I made a mistake then I would sadly have to make the whole front panel again (sigh. . . another four hours gone).

Well, the way I went was with several long grub screws, a few bolts, and Aluminium 'L' brackets.

All you need to do is drill several holes (in key places) a bit over halfway into the Aluminium front panel. As the Aluminium is 3mm thick, I drilled down about 2mm. You'll then need to tap the freshly drilled holes so that the grub screws will screw in (make sure that you use kerosene when tapping, it is the lubricant for Aluminium).

Now you have something to attach the front panel with. Before attempting this on the front panel, make sure you use scrap Aluminium until you have perfected the process – don't think you have the magic touch straight off.

This method of attachment is surprisingly strong – just as long as you use a few grub screws, and there are no visible marks on the front panel.

Efficient labelling on the cheap

You might have heard of the companies Letraset, or DECAdry? Both sell products that you can use to label the front panel of your MP3 box cheaply.

If you have the money, or a friend that has access to silk-screening tools, then by all means use them.

The DECArdy products that you can use for labelling are what people previously used to make print-like headings for documents and assignments at home – before the computer came along with the home printer and destroyed the need for stick-on lettering. Though it is an old product, this doesn't detract from its usefulness for labelling metal and other surfaces.

You can usually find DECAdry products in art shops and maybe in a few newsagencies, but as they're not as widely used as in previous years they can be hard to find.

You can order them from the company's Website if you can't find a shop that sells them.

The only trick to labelling the front panel is to align each letter to form a word that isn't all over the place like toddler scribble. Take your time and use a fine pencil to mark a straight line which you can use to align the letters accurately. I found that you can then use a rubber to remove the pencil line when finished, without leaving a mark.

Each DECAdry transfer sheet can label the entire front panel and it should only cost around $4.

Stick-on lettering will prove cost effective compared to other methods. The only downside is you can't have any letters or shapes that are non-standard, and is the reason why I didn't have the Aural Decipher logo on my case.

The labelling is fairly durable. It hasn't degraded on the Aural Decipher yet – just don't purposely scratch the labels because it is possible to remove them (this is only good if you make a mistake).

Aural finale

If you've come this far and completed your MP3 box, then you have achieved something significant.

Sit back and admire your handy work: it was built on a lot of blood, sweat and sleepless nights I bet! The three part tutorial was never meant to be simple and I'm sure that you have cursed, fumed and almost given up a few times – was it worth it? Well, after I finished the Aural Decipher, I know the answer was a definite 'Yes'.

How I attached the front panel. On the opposite end, there is an identical bracket, and a smaller one located at the bottom centre.

Linkage

Carpral Aluminium – www.capral-aluminium.com.au
EMC documentation and resources – www.linuxcnc.org
Letraset – www.letraset.com
DECAdry – www.decadry.com
Nepean Boltmaster – www.nepbolt.com.au
Super Cheap Auto – www.supercheapauto.com.au/electrical.html

The 'sink

Ever had that sinking feeling when you realise your vid card is getting rusty in the GPU? Ron Prouse shows you how to get some meat from your aging card with this mod.

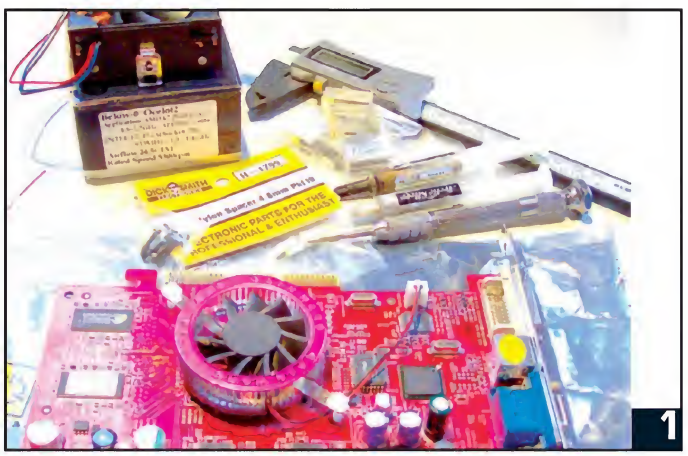
You will need:

- An Ocelot 2 HSF, $36, kindly supplied by Below-0 (www.below-0.net).
- TweakMonster RAMsinks – eight for $59.40; Artic Silver thermal epoxy – $22, supplied by PC Case Gear (www.pccasegear.com).
- A 1.59mm drill bit and drill – preferably a drill press.
- A 2mm thread-tap, four 2mm X 16mm screws and nylon spacers – $6 (Dick Smith Cat# H-1799).
- Your old GeForce 2, 3 or 4. . . any card that has the 4 x 2.2mm holes around the perimeter of the GPU.

You probably remember the day you sold your Grandma to buy that uber-fast, expensive video card that you just had to have. . . and the truth is now, that it's. . . well, old. A GeForce dinosaur, if you will.

Two options: learn to live with one kidney and get 'the latest optical experience,' or spend a satisfying afternoon improving the performance of the card that you already have.

Selling body parts is *so* Neuromancer, so let me walk you through the alternative.

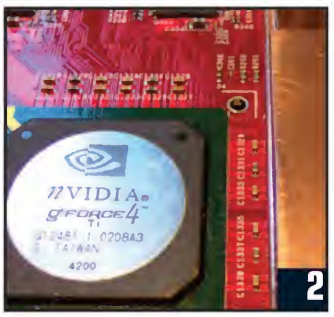


ABOVE: Everything that an air-cooled graphics card really needs

As most of us have accepted, the main obstacle to overclocking anything PC is the unavoidable increase in heat – beat the heat, and you have a new envelope to push. Overclocking a graphics card is no different to overclocking a CPU, and the cooling method used is exactly the same – a more efficient heatsink fan (HSF). The idea is to lower the temperature of the chip and RAM to acceptable levels while running at speeds well above default.

Now, many of you may have already replaced the card's OEM HSF with a heavier-duty 'Blue' or 'Crystal Orb', and gained some performance, but now is the time to get industrial!

The HSF used here is a low profile IU (rack mount server) unit, and the combined weight of the micro-fin copper heatsink and 60mm/23.5cfm fan is a hefty 220g – with this mod you don't just block PCI slot 1, you'll obstruct it from view completely.



ABOVE: If your card has these mounting points, mod on!

I will assume that you know how to remove the standard HSF – if not, you should probably reconsider proceeding! First step is to strip off the fan and shroud and ascertain the best orientation for the bare heatsink – that is, be sure that the base makes flat contact with the GPU, but has clearance between it and everything else around it (capacitors, diodes, AGP slot, etc). You also need to make sure that the 'step' in the base is off to one side of the GPU core. Once it is in place, use a small nail to mark the position of the four holes, and drill corresponding holes right through the base of the heatsink. Use a larger drill bit to countersink the holes slightly as this will give the tap a better starting point. Drill two holes to start with, and drill the other two after the next step, as this will help to line them up perfectly.

Using the thread-tap, carefully cut threads into the holes, one and a half to two turns in at a time. Back the tap out of the hole regularly to remove the excess Copper, and use a lubricant like WD-40. Don't use too much force, and take your time as small drills and thread-taps are brittle and break easily. Then you will discover the fun of trying to get the bits out – if you can!

Once the four holes are drilled and tapped it is time to clean off the card with isopropyl alcohol, reassemble the HSF (minus the clip mechanism), apply a thin, even coat of thermal paste, and bolt it all together. To protect the card, use nylon spacers under the heads of the screws. There are two important rules when attaching the HSF. The first is to do the screws up a little at a time, in an 'X' pattern. This will keep the contact area flat and apply an even pressure across the GPU. The other rule is to only do the screws up to 'finger tight' plus a tiny bit more – going sick with a screwdriver could easily damage the GPU, so take it easy.

ABOVE: The finished article. . . all 440 grams of it.

With the GPU taken care of, it's time to give the RAM some attention. The RAMsinks here are the 'Rev.1' type – obviously use the later 'Rev.2' type if you have Ball Grid Array (BGA) memory. The biggest danger in fitting RAMsinks to older-style RAM is when conductive thermal epoxy oozes across the 'legs', creating paths that will cause short circuits. Artic Silver also makes a non-conductive epoxy: 'Alumina', which might be a good alternative if you don't quite have the hang of the term 'thin

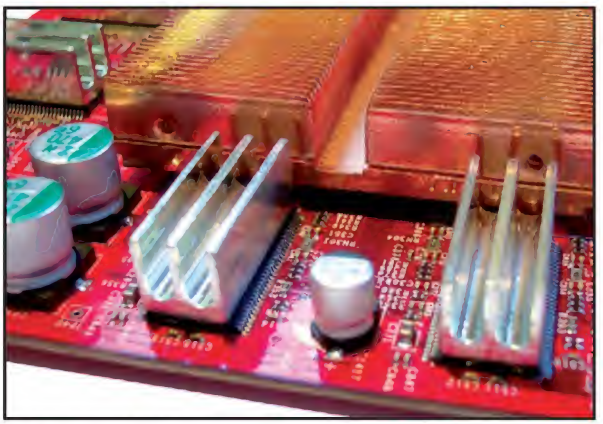
layer'. With DDR-RAM, epoxy the four RAMsinks on one side, and allow 30 minutes for it to dry before turning the card over and gluing the other four on.

It's a good idea to use a magnifying glass to check that the 'legs' don't have any conductive epoxy on them. If they do, it can be carefully scraped off with a razor blade when dry.

Replace the card into your mobo, load up some 'quick' drivers (42.09s) and start pushing the limits of a new envelope! The results for this Gainward Ti4200 64MB, measured against default, were:

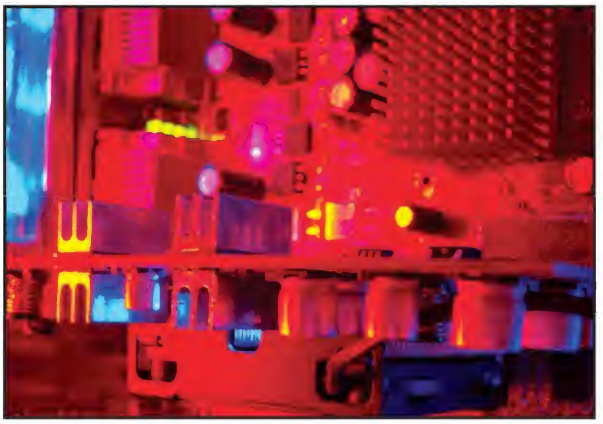
- An increase in stable core speed from 250MHz to 325MHz (30%),
- Memory went from 513MHz to 581MHz (13%),
- Core temperatures dropped by 10°C,
- The card will now run happily at 150MHz FSB (from 145MHz).

Benchmark scores in 3DMark2001SE Pro v330 went from 10,279 to 11,716. This is an overall gain of 14 percent.



ABOVE: Don't get any of the epoxy mix on to the RAM 'legs', as it can cause shorting.

ABOVE: Keep the main HSF base centred on the GPU, with the 'step' off to one side.



ABOVE: An LED can be placed in the retainer groove and powered from the OEM HSF power-header.

Too stuck up. . .

Performing a 'one-way mod' on expensive hardware can scare some people, and one of the common questions is: 'How can I remove something if I have "glued" it together with thermal epoxy?' ... such as the RAMsinks used on this video card.

The easy answer is 'You can't!', but that is really only half-true.

A thermal epoxy bond can sometimes (note the word 'sometimes') be broken by placing the item in an anti-static bag, sticking it in the freezer for a few hours, and then carefully prying the two surfaces apart with a credit card, or similar, while they are frozen. Just like getting chewing gum off clothes.

The best cure is always prevention, and with Artic Silver products the process is really simple. AS Thermal Epoxy is a two-part mixture, one part 'A' to one part 'B'. The resultant adhesive sticks like the proverbial stuff to a blanket.

The way to achieve the same high-level thermal bond, without the same degree of physical grip, is to add an even amount of ASIII Thermal Paste into the Epoxy mixture.

In other words 25% Part A, 25% Part B and 50% Thermal Paste. This concoction will take a little longer to 'go off' (or harden) than pure epoxy resin does, but once it has set properly the bond is not much weaker than normal... it simply lacks the same 'torsional' or 'shear-strength', and can be pulled apart – with a little persuasion.

WindowDVD

It's windowy, yes it is. Tired of hearing the bearings grind in your old drive? Well, now you can watch your CDs oscillating as well!

You will need:

- A cutting method – preferably involving a jigsaw – a drill and 3/8in bit; a file; various grades of sandpaper; and a can of your favourite flavour of 'Black and Gold' cat food;
- A piece of glass 12cm x 12cm x 2mm thick and Silicon;
- $15 three-LED LazerLED from PC Case Gear (www.pccasegear.com); and
- Two 2mm x 16mm screws/star-washers/nuts and soldering equipment.

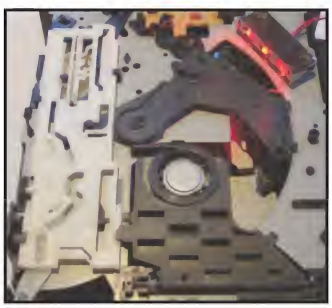
My first ever 'top window' installation was for a reason that made sense at the time – my computer rested on a shelf next to my left knee, so if I was going to see anything it was going to be through the top of the case! That was all well and good, but once it was done I realised there was nothing to actually look at apart from a boring, grey DVD-ROM drive.

As if *that* was worth looking at. . . unless. . .

I need to point out a fundamental element of this mod: it was performed on the popular slot-loading Pioneer 105SZ. So what? Well, most late-model, tray-loading CD-ROM drives have a 'Disc Locating Boss' attached to the top of the casing, right where the window would go. Removing this 'boss' commonly leads to a phenomenon known as 'discus random inflightus', which in turn will lead to the chance to replace it with a new Pioneer slot-load drive.

Cutting the window out is the same as cutting any other hole in sheet metal. Work out the best position, scribe the desired shape, cut it out and smooth off the edges. I decided to place an 80mm round window directly above the centre of the disc. The first step is to remove the bezel and top cover of the casing, then measure where the disc-centre is in relation to the cover. Transfer the measurements onto the case, and determine where the centre of the proposed hole will be. Mark several spots 40mm (the radius) out from the centre to help get the template, which is the can of cat food, into the correct spot. Scribe around the cat food, drill a pilot-hole and jigsaw away. Clean up the hole with a file and then sand it smooth from coarse to fine grit.

BELOW: This is the perfect application for a LazerLED: compact, easy to mount and 12V.



Here is a neat trick. Wrap the sandpaper around the can – it's almost the same size as the hole and it will help prevent sanding the circle into an oval. Easier on the fingers, too. Once the window is finished, attach the glass with a smear of clear Silicon and let it cure. For those who would rather use plastic than glass, the top of a CD jewel case is almost the perfect size.

ABOVE: Got a top window? If not, then you need one of these!

While the top cover is drying, it's time to wander around and find the best spot for mounting the LazerLED. On the Pioneer drive it's a no-brainer, as there is plenty of room on the right of the loading mechanism. Position the light, mark the mounting points and drill the holes in the top bracket. Attach the LazerLED and, as a precaution, use 'shake-proof' washers under the nuts. CD-ROM drives vibrate, and you don't want the light coming loose and hitting a disc at high speed.

ABOVE: Steady. . . everyone loves a good close-up view.

The wiring part is easy. If you want to be able to switch it on and off, run the wires out through the back of the casing to the light switch you are going to power it from. I have made this an 'always on' installation, so that everything is self-contained. This is simply a matter of soldering the LazerLED wires on to the Molex socket inputs – where the yellow and black connectors are fixed into the PCB.

Although the joints are 'spaced' away from the DVD casing, it is a good idea to cover the connections with some insulation tape to avoid possible arcing.

Test that the light is working correctly, reassemble everything, and bask in the reflected glow that only a modded CD-ROM drive can provide.

ADD TO TROLLEY

Thermaltake Xaser III V1000C

Early in the 18th century, computer cases were beige. Back then people were stupid, which explains the ridiculous choice in colour, as well as the moronic reliance upon horses, too.
Through the 1950s and 60s, computers were built entirely from flashing lights. That was the golden age of computing. Now, in an attempt to regain the glory days, Thermaltake has created the Xaser III case. It's blue! It also has flashing lights. That makes us happy. It could make you happy, too, if you won it. Thanks to Garrison at Anyware (www.anyware.com.au) for this wooty prize.

Q: What accelerant was used for the creation of *Atomic 10*'s cover?

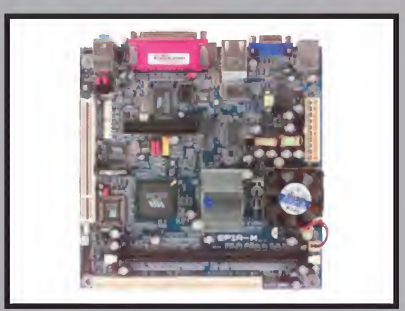
Video Logic ZXR-550

In a distant corner of the galaxy, far, far away, is a world without sound. The inhabitants of this world, known as 'Bladge', don't have any ears.
Thus, to the poor Bladgeians, the concept of sound is as abstract as the 11th dimension is to us. All things being equal, over on Bladge they have the coolest rollercoasters in the galaxy, while back on crusty old Earth, we have the Video Logic ZXR-550 speakers.
Fairly much the same thing, in ways. Find out for yourself, if you win this comp. Thanks to Westan (www.westan.com.au – 03 9543 7733) for the rollercoaster.

Q: What homeworld-less race attacked in Master of Orion 2?

VIA EPIA-M9000

Small and beautifully designed can often win over big and less pretty, but faster. Such is the case with the VIA EPIA-M9000, which you'll find we've reviewed on *page 48* of this very issue. The VIA EPIA-M9000 is cool because it has integrated everything – and it's tiny. It's the perfect mod-board! With this baby your modding imagination is limited only by the smallest thing you can think of.
So, thanks to the generosity of VIA (www.viavpsd.com) we're able to make you all enjoy *Atomic* Trivia, as a side-benefit, and one of you gets the big, small prize as an ultimate thing.



Q: What health risks does an all-Perspex case pose?

EMAIL ENTRIES TO WIN@ATOMICMPC.COM.AU OR POST THEM TO: *ATOMIC*, PO BOX 275, BEACONSFIELD NSW 2014. PLEASE SEND A SEPARATE ENTRY FOR EACH COMPETITION. PLEASE ENSURE THE COMPETITION NAME IS THE SUBJECT OF THE EMAIL, OR IS DISPLAYED CLEARLY ON THE FRONT OF THE ENVELOPE. THE CLOSING DATE FOR ENTRIES IS 16 JUNE 2003. WINNERS WILL BE ANNOUNCED IN *ATOMIC 30*.

Atomic 26 Winners: GTA Vice City PS2 Pimpin' Pink Pack: Q. What would I be wearing if I was in a gunny sack and espadrilles? A. A gun holster bag and canvas shoes with plaited fibre soles. M.Bonavia, Donvale, VIC. Impossible Creatures: Q. Which Australian winery was one of the sources of fruit fly breeding stock for worldwide genetic research? A. Tyrells Winery, Hunter Valley. S. Noske,Ferntree Gully, VIC; T Mcloughlin, Ferntree Gully, Vic; A Kovacevic, Langwarrin, VIC;D Wilkinson, Upper Coomera, QLD;E Muller, Oxenford, QLD. Innovatek Set 5 AMD water-cooling kit: Q. What atmospheric phenomenon is attributable to the pooling of unusually cold water in the Equatorial Eastern Pacific ocean? A. La Niña. N Leong, Bulleen,VIC.

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Evenly spaced. . . like stars

Atomicans are often rankled, sometimes effused, but always vociferous. Here's some of that, on these here pages. The letter and forum post that tickled us most this month win the really neat Logitech MX500, so you can own at CS.

Sick of cheats

What the f**k are we going to do about the f**king cheats that play online? I have been playing CS online for about three years now and I would call myself an above average player, but how can I rate myself against people who decide to cheat?

I am sick to death of these bloody bastards spoiling it for the non-cheaters who are trying so hard to get kills. You know, the ones that have a 300 ping and still manage to get 60 kills and five deaths – that is absolute BS – I don't care how good you are – you're not *that* good.

CS is a game of skill, tactics, reflexes and teamwork. Why do these people decide 'Hey, stuff this, I'll just download OGC, set up my aimbots and wallhacks and kick some arse!'?

Where does any skill come into play here? It doesn't.

I admit I have downloaded OGC (Online Gaming Cheat) and used it online just to see what I am up against and I can say I was astounded. Aimbots that can be programmed to hit your enemy in the head or anywhere you so desire. You can see through walls, crates, behind doors. You can speed up your movement. You can have your enemies run around in fluoro skins so they stand out more. You can have footprints onscreen so you can tell where your enemies are running. You can have names, health, types of weapon, location and various other bits of info about your enemies onscreen. . . and the list goes on. I played with OGC for a few days and thought 'How the hell do I stand a chance without it?'

I would like to see something like what they do with Everquest or any MMORPG: have the core operating game files and character info installed on a central server that everyone that wants to play can log into.

I have given up playing CS online at the moment because it's getting to the stage where you think 'Bloody hell am I the only one on here *not* cheating?'.

Regular players that don't cheat will relate to these oddball scenarios:

1. The headshot with a pistol from the other side of the map (*if the headshot wasn't bad enough*).
2. The headshot from a sniper who jumped around a corner and got you while he was still in mid-air.
3. Being grenaded 10 times from the same person in the same round (*outside of their spawn, of course*).
4. Being shot through a door while you are hiding behind it (*and you've been sneaking the whole round – while crouched*).

So now I have resorted to practicing with bots (yeah you can stop laughing now) or having a few mates around and playing on my LAN. At least with a LAN and mates you know they are not cheating.

I just wish these cheaters would uninstall their cheats, forget about the high scores and play unaided – then we'll see how good they really are.

The Jackal

LOTM: Forum behaviour

After reading Vanne de Castle's scathing attack on the 'Lite Windows' idea in last month's letters, I feel that all too often opinions are turned into attacks, especially when it comes to computer related issues and even more so, computer forums.

The classic scenario: a newbie logs on to a forum for the first time, asks a question or presents an opinion and is systematically shot down in flames by experienced members of the forum.

The newbie retreats with their tail between their legs, in some cases never to come back.

This behaviour has some interesting ramifications; none the least being the forum grows very stagnant, reflecting only the opinions and knowledge of the few old timers.

Without the injection of new ideas, opinions and experiences, nobody will benefit – and just remember, even us technically savvy Atomicans were innocent, curious newbies once too.

One person's perspective may seem incorrect or illogical, but this different approach might spawn new ideas or techniques down the track.

If new ideas and perspectives are shunned, we will never know they even existed.

So next time somebody posts a seemingly idiotic question or opinion, take a deep breath, remember that it wasn't posted just to annoy you, and constructively offer reasons why this is incorrect or ask why they have this opinion. . . you never know, you might learn something.

Christian Benci

POTM: Was the information worth it?

By the-dude

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=5629

Fiction on the forums is nothing new. We've had more than a few storytellers at Atomic share their talents, but the-dude blew us away with his gritty account of a post apocalyptic future where a man is truly judged by the size of his weapon. Spurred on by Atomicans who couldn't get enough, the-dude kept adding chapters to the point where he's virtually committed himself to doing a book, or even a movie. With Stevan Segal. The-dude's epic is currently standing at an epic 12 chapters, here's a taste of chapter 1:

Grey wisps of smoke rose from the-dude's tortured battle armour as he stealthily emerged from the secreted bunker. They twisted and shimmied like crazed demons in the half-light of dusk, looking all the while not out of place on his battered kevlar. His boots are old and cracked like his weather-beaten face from too many years of war, strife and fast women. In his right hand he holds a Z-90 BFG, which conducts a steady sweep from right to left, while his left hand clutches a data disk with whitened knuckles.

Life on the run is a hard game to play.

Hurriedly his slitted eyes scanned the surrounding terrain for anything out of the ordinary, any nuance or subtlety that heralded a flash of light and impending pain. . . nothing. The coast was clear. His body involuntarily shuddered, and his left side had a cruel ache, a legacy from last night's heavy bombardment, when he was caught in the open while recovering mission critical intelligence from another operative.

Observing the trip wires to be intact, the-dude gave a low whistle to signal the rest of the squad. Warily, Transmission Dump stepped out into the open. A hardened veteran of many campaigns with the dude and Division 4, he wore a lot of scar tissue like a badge of honour. A well used RL-50 solid fuel boost-modified rocket launcher scanned the ridge line in his left hand, while his right lights a trademark roll-your-own with a home made zippo.

'Pretty heavy last night huh dude? F**k, look at craters everywhere,' Transmission said.

'Yeah,' the dude grumbled, his ears still ringing, 'but I got the bloody files. . . the ones that are gonna rock the establishment to the core. How's your shoulder man?'

'Just a scratch,' Transmission replied, which the-dude mentally translated as 'I have a dirty big hole in my arm where the armour was vapourised last night but it'll give me a cool new scar.' The-dude laughed quietly at the toughest mother he had ever met.

The other members of Division 4 filed out of the bunker and silently took up field positions in a 500-metre perimeter spread with the company's best sniper, 1shot1kill, striking out for the ridgeline. He calibrated his laser scope as he walked and reflected on his short stint in Division 4 working with the notoriously rebellious the-dude and Transmission. He laughed quietly to himself as he remembered their last crazy night on leave before they went 'up country'. Division 4 had commandeered the seediest nightclub in town and proceeded to paint the town red on a hacked credit chip with a 200,000 chit limit. 1shot grinned like a schoolboy as he remembered the prettiest dancer in the club dragging him up the stairs for a personal show.

It was cold. The temperature dropped suddenly after dark, and there was ice at every elevation.

'Fuck, I'm Frosty the fucking snow man again,' 1shot muttered as he set up his sights and monitored the valley below that snaked away to the north like gnarled old fingers. 'C'mon you bastards, where are you?' he breathed as he scanned the other ridges many kilometers away. The enemy had been active every night this week and tonight would be very interesting, because they thought that entire crew from Division 4 were dead. Last night's mission had been compromised and then the shit went down, and it went down hard. The earth had come alive in a tortured frenzy of writhing, frothing, demented boiling of rock and dirt as the bombs rained down in a continual tumult.

1shot hoped the information was worth it.

Benchmarks: Like we don't have enough already

How about a benchmark that measures real-world number crunching, yet will run on virtually *any* platform? With such benchmarking, you could even be a part of a greater purpose. How would such a creature evolve, what arcane things could one do to measure such ethereal things. No, not Scientology. The answer, like a lot of things, comes from *out there*. SETI. That's right, the geeky process that no Atomican should be without. But how can looking for aliens tell you anything about your pride and joy? Picture this, then, if you will.

I own a Duron. It runs just under the magic 1GHz mark. My humble machine can crunch a single SETI workunit, using the CLI fullscreen, in approximately six hours, 40 minutes. Taking my last 10 workunits into account yields an average of six hours, 52 minutes. Plug this into the magic formula: (1 / ([A*60] + B))*10e6 (where A is the number of hours and B the number of minutes).

So, if A is six and B is 52, this gives me a total of 24,272 SETIMarks (for want of a better name). Compare this to my old PC, a venerable Pentium 233MHz MMX. The average here is just over 40 hours. In fact, 40 hours, five minutes. Whisking out the magic formula spurts out a mere 4,158 SETIMarks, kilofloggits, whatever you want to call them, I only get that many. This is a system that works independent of DirectX, OS – everything besides hardware. If you can run the SETI CLI then you can record a SETIMark. In my SETIClass alone (May 4 2001, I rank in at 150) there are scores ranging from 566 (294 hours, 30 minutes!) to 32,362 (five hours, nine minutes). Perhaps there could be a SETIMark Database. One thing, though, you couldn't rely on the SETIMarks for average CPU time/workunit, you'd be best to average your last 10 results yourself to minimise the chance of error, or to discount multiple PCs from playing with the score. Am I onto something here? Or do I just get far too much time to think at work?

Aethir

Age of Mediocrity

The Egyptians are giving me grief. Not the flesh-and-blood kind, rather, the ones in my computer. I spend my nights pounding their little citadels into submission, only to have my Greek warriors sliced into shawerma.

I'm addicted to Age of Mythology, an obsession that involves building an empire and rousting the neighbours. In my head, my faux-dictatorship is as real as yesterday's No Doze. Trumpets make me tense, and the doorbell has me running for shelter. I'm sizing up the trees in my yard for wood, and I can interpret a few more words from my Greek barber (a change from 'twenty-five bucks mate' and 'this should stop the bleeding').

More objectively, I'm intrigued by the mythology of the game. If you haven't yet played, the AOM campaign has you flinging swords as Greek hero Arkantos. Like a cross between Homer's *Odyssey* and the Boxing Day sales frenzy, Arkantos' major quest involves helping some Egyptian bint find and reassemble the pieces of the god Osiris, tossed to the four corners of the world.

Despite the fact Greece didn't even rate as a chipshop in the first Egyptian dynasty, this stab at the mythos is reasonably accurate. According to Egyptian legend, there was a great feud between the King of the Gods – Osiris – and his brother Seth. Seth came up with a plan to dispose of his sibling: cut him into pieces and send his bits down the river ('his head went that way and his leg went that way'). Isis, wife of Osiris, then went on a long journey to find the pieces and reassemble her husband into the first mummy.

But there's more to this story than the game lets on. Seth apparently severed the phallus of Osiris and dropped it into the Nile, where it was eaten by a fish (d'oh!). When Isis pieced her husband back together, she was forced to make a replacement member out of clay (presumably the first written evidence of the word 'dildo'). Oh, the perils of being an Egyptian god.

There are equally sordid tales from Greek mythology – things you'll never see in a Microsoft product. Ever wondered where the Minotaur came from? The legend tells of a witch called Pasiphae afflicted with an unnatural desire for bulls (that's right: bulls). With the help of Daidalos, Pasiphae hid herself in a cow made of wood and. . . the rest is history. Not easy to animate in a computer game, but more accurate.

The Norse legends are also questionable. Loki, God of Fire and Chaos, could apparently change his sex at will. As the original indoor sportsman, Loki mated with a number of lesser gods in quick succession, fathering Hel, Goddess of Death, Jörmungand the Serpent, and Fenrir the Wolf. Then as a woman he bore Sleipnir, God of Sexual Ambiguity (just jokes). I'm starting to see why the Scandinavians invented the kilt. . .

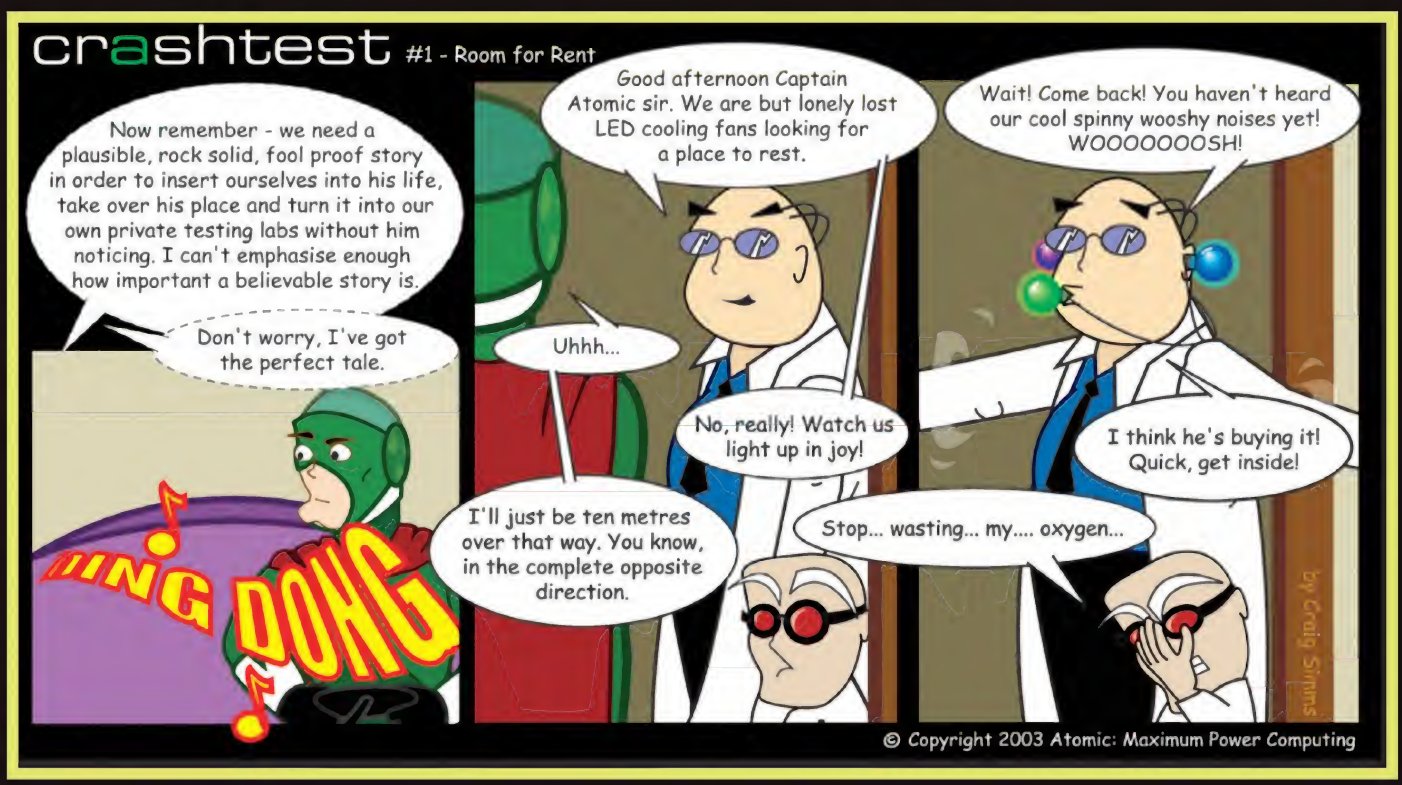
I'm guessing there are only so many legends the game developers can savage. What then? Well, I've consulted my crystal ball (the same one that said Kim Beazley would become PM and that the mullet would make a comeback) and I predict a strategy game set in the present day, called Age of Mediocrity. It goes something like this. . .

Rather than a central village, you're based around a suburban house. Farms become computer desks, where you work to make cash, not crops. Forests become rubbish dumps or footy grounds, for collecting Aluminium cans. Gold mines are nightclubs or bars, where you score for each 'score' (you can either take your partner back to the house, or to a nearby panel van).

Then there are the special units: the Jehovah's Witness, knocking on homes until you're forced to leave; the Slut, a nightclub patron that distributes viruses; and the Greenie that forces dumps to be relocated to the other side of the map. There's also the Property Developer that bulldozes everything in its path, and the Shane Warne unit that performs like a champion, until your opponents research pharmaceuticals.

My biggest concern is that the game will be unrealistically sanitised. The last thing I want to see is a milkman who only delivers milk, or a council worker who actually works. Let's face it: there's only so much mythology we can bear.

John Simpson



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